WMESS 2017

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World Multidisciplinary Earth Sciences Symposium

ABSTRACT COLLECTION BOOK

Eco-friendly Symposium - WMESS

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SEPTEMBER 11-15
2017
Prague - Czech Republic

Preface

This Abstract Collection consists of the abstracts of papers presented in the “World Multidisciplinary Earth Sciences Symposium” in the city of romance Prague (Czech Republic) during 11-15 September 2017. The World Multidisciplinary Earth Sciences Symposium (WMESS) aims to provide a forum for discussion of the latest findings and technologies in different fields of Earth Sciences, to give opportunities for future collaborations. WMESS wants to be a platform for sharing knowledge and experiences in the fields of Earth Sciences, to lead for providing a forum for early career researchers for presentation of their work and discussion of their ideas with experts in different fields of Earth Sciences such as; Tectonics & Structural Geology; Engineering Geology; Geotechnics; Hydro-Hydrogeological Sciences; Natural Hazards; Geomorphology; Geochemistry, Mineralogy, Petrology & Volcanology; Stratigraphy, Sedimentology & Palaeontology; Geophysics & Seismology; Geodesy, Photogrammetry & Cartography; Informatics, Geoinformatics & Remote Sensing; Mining Engineering; Mineral Processing; Blasting & New Technologies; Natural Resources; Environmental Sciences; Energy, Resources & Pollution & the Environment; Environmental Legislation; Biogeosciences; Geological Heritage & Geoparks; Urban Planning; Atmospheric Sciences – Climate; Modelling and Soft Computing Techniques in Earth Sciences; Medical Geology; Occupational Health and Safety.

WMESS 2017 will be the 3rd of the Annual series and the main mission of the "World Multidisciplinary Earth Sciences Symposium - WMESS" is to lead to contribute in multidisciplinary studies related with atmosphere, biosphere, hydrosphere, lithosphere and pedosphere of the Earth and interaction of the human with them. As another mission, it provides a forum for this diverse range of studies, which report very latest results and document emerging understanding of the Earth's system and our place in it. The Scientific Committee and Institutional Scientific Partners of WMESS was completed by paying strict attention, and all members were selected from well-known, very much appreciated, productive and representatives of the different countries. We are deeply grateful to the members of the scientific committee and institutional scientific partners (International Association for Engineering Geology & the Environment – **IAEG**, International Union of Soil Sciences – **IUSS**, International Geographical Union – **IGU**, The International Association of Hydrogeologists **– IAH**, Geological Sciences of Italy – **SGI**, Czech Soil Science Society – **CSSS**, Arabian Geosciences Union – **ArabGU**, The Society of Economic Geology of Romania – **SEGR**, World Meteorological Organization – **WMO**, International Medical Geology Association – **IMGA**, Russian Mineralogical Society – **RMS**, National Univ. of Science & Technology - Moscow Mining Institute – **NUST MISIS**, Geological Society of Africa – **GSAf**, University of Petrosani) of WMESS.

We would like to express our sincere gratitude to all participants of WMESS 2017 from 50+ different countries all over the world for their interests and contributions in WMESS 2017. We wish you enjoy the World Multidisciplinary Earth Sciences Symposium – WMESS 2017 and have a pleasant stay in the city of romance Prague. We hope to see you again during next event WMESS 2018 which will be held in Prague (Czech Republic) approximately in the similar period.

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ABSTRACT

The Salinas Grandes and Salina de Ambargasta, on the eastern side of the Sierras Pampeanas in Argentina, constitute an 18,000 km2 tectonic depression. The eastward advance of the tectonic deformation is evident in the topographic elevations that intercept the Llanura Chaqueña. The interpretation of the tectonic processes that create the Salinas Grandes and Salina de Ambargasta are primarily due to the observation of morphotectonic macro indicators and structural field data. These geoforms allow us to interpret the horizontal deformation that has produced the right side displacement of parallel shears within a dextral releasing bend and restraining bend setting. This process occurred within a transtensional-transpressional setting, which produced a depression closure where lakes formed, the formation of Alto de Mancilla, deviation of rivers, the rotation and displacement of ranges and the transformation of lakes into salt flats. These processes are active and are shown by the hydro transference area where the Dulce River discharges into the Salado River, resulting in a considerable decrease of water flow into the Laguna Mar Chiquita.

VARIATION IN GEOMETRY ALONG STRIKE FROM BASEMENT-INVOLVED FAULT PROPAGATION FOLD TO A BASEMENT-INVOLVED WEDGE STRUCTURE - AN EXAMPLE FROM KHARAN FORE ARC BASIN, PAKISTAN

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ABSTRACT

The kinematic evolution of a basement involved fault propagation fold, how it changes to wedge structure along the strike and its implications on associated hydrocarbon structural traps have been studied. Newly acquired 2D seismic data is used to examine the geometry of WSW - ENE oriented subsurface structure located at forefront of Raskoh Range, the possible deformed part of Kharan Fore Arc Basin. Presence of growth strata at multiple levels helped in sequential restoration of the seismic profiles for the kinematic analysis. The studied structural trend has two distinguished parts: the western part verges southward forming an anticline above imbricate of basement involved reverse faults and the eastern part verges southward at deeper level whereas verges toward north at shallower level forming classical geometry of basement-involved wedge structure with wedge point within sedimentary strata. Both of these parts are separated by a transfer zone where strata appear to be relatively undeformed. But reflections are less coherent in this zone, which suggests small offsets unresolved on 2D seismic data. Just north of studied structure, strike slip faults, having NE-SW strike - same as of transfer zone, are observed in Raskoh Range which have dislocated the axis of the folds up to 100s of meters. Normal faulting at crest of the fold is also observed particularly in syn- and post- structuration strata. Seismic profiles and a structure contour maps at multiple horizons indicate that shortening varies along strike. Kinematic analysis suggests that lateral change in competency of rocks and degree of shortening possibly affect the variation in structural geometry along the strike. The possibility of local pinning within the transfer zone cannot be ruled out but it is not clearly evident on seismic data. However, transfer zone may be related to strike slip faulting in Raskoh Range and is apparently younger than the wedge structure. In addition, pinning due to thick sediments at deformational edge of fore arc basin could not allow further movement along south verging faults toward fore arc basin. This likely originated basement-involved wedge structure in which shallow strata was easily displaced along north verging faults due to lowering in overloading because of erosion in hinterland. This study thus exemplifies the complexity of basement-involved wedge structures and also provides insight about mapping of structural traps in such a complex structuration

PALEOPROTEROZOIC ROCK METAMORPHISM OF THE NYARTIN COMPLEX, THE SUBPOLAR URALS

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ABSTRACT

In the Urals, Archean and Paleoproterozoic formations are revealed as a part of some polymetamorphic complexes which crop out onto the day surface in relatively small tectonic blocks (up to the first thousand square kilometers in area). Belonging of rocks composing polymetamorphic complexes within the Western tectonic zone of the Urals, which located west of the Main Ural Fault, to the Archean-Paleoproterozoic section is most reliable. These complexes are interpreted as fragments of the heterogeneous crystalline basement of the Ural part of the East European craton. Nevertheless, belonging of only two South Ural complexes: the Taratash and Aleksandrov to the Archean-Paleoproterozoic section causes no special disputes due to the relatively weak geochronological study of the polymetamorphic formations. They are framed by the weakly metamorphosed Lower Riphean deposits; reliable geochronological data are obtained on them, which unambiguously indicate the early Precambrian age of rock metamorphism. The existing Early Precambrian dates (with the prevalence of Late Precambrian and Paleozoic ages) for other Ural polymetamorphic complexes are interpreted in different ways. Therefore, their attachment to the Lower Precambrian section is disputed by many researchers. Taking into account the already available data and the first results of mass U-Pb dating of metamorphogenic zircons from gneisses of the Nyartin polymetamorphic complex in the Subpolar Urals, the Paleoproterozoic age of the earliest stage of rock metamorphism is substantiated in the paper. This gives grounds for the conclusion that this geological object belongs, as well as the Taratash and Alexandrov complexes in the Southern Urals, to the Lower Precambrian formations involved into the Uralides' structure.

The work was supported by the Basic Research Program of RAS ? 15-18-5-17

U-PB AGE OF DETRITAL ZIRCONS FROM UPPER PROTEROZOIC DEPOSITS OF THE POLAR URAL

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ABSTRACT

The problem of the age of the basal deposits in the Timan-Northern Ural region remains unsolved. To clarify it, an isotope study of detrital zircons from the meta-sandstone of the lower part of the supposedly Upper Proterozoic is carried out? rocks of the Central tectonic Zone of the Polar Urals. The upper Proterozoic sediments here are metamorphosed to the level of the green shale facies of the volcanogenic-sedimentary formations Nyarovey series. 100 zircon grains of the lower part of the Nyarovey series were studied with the help of the U-Pb LA-SF-ICP-MS method (Ulan-Ude, Russia).Of the 100 analyzed grains of zircon 21 zircon with high discordance (D?10%) were excluded from consideration. The maximum age shows the value - 2859 million years (Archean), and the minimum age is - 595.2 million years (early Vendian). The main sample of dating, including 77 analyzes, covers an interval of 2028.1-660.1 million years and forms three age groups with maxima at the levels 1,700.1225, and 675 million years. Similar zircons presented comparable age populations typical of the rocks of the gneiss-migmatitic and other of polymetamorphic complexes of the Urals. More realistic is the restriction of the lower age interval of the Nyarovey series to a boundary 660 Ma ago, the end of the late Riphean. The obtained U-Pb dating points to the inaccuracy of the selection of the Nyarovey series as the Middle Riphean stratum. Most likely, the whole section of the series belongs to the upper Riphean, and the age of the final episodes of sedimentation has lower limit is 660 million years ago.

The study was financially supported by RFBR in the framework of a research project ? 16-35-00146 mola, as well as with the support of the Programme of Fundamental Research RAS ? 15-18-5-17.

EVIDENCE OF ACTIVE TECTONIC IN THE CHERCHELL AREA (WEST ALGIERS)

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ABSTRACT

In the Maghreb, and particularly in Algeria, the tectonic activity was characterized by fold and faults which affect all the geological levels, including the Pliocene and the Quaternary level. These deformations carry on until now. According to the historic seismicity (CRAAG, Benouar, 1994), the area of Cherchell does not seem to have registered earthquakes, but on the other hand, it was affected by earthquakes of the neighboring areas (El Asnam.1980, Chenoua, 1989) which caused some important damages. The geological investigations in Hadjret Ennous (Cherchell) area showed that the deformation in the Quaternary formations is essentially materialized by normal faults in the conglomerates and strike slip faulting between marls of Plaisancien and the conglomerates of the Quaternary. The set operates according to dextral transpressional deformation system following thickening of recent plio- quaternary deposits in the pull-apart basin. Taking into account main Neotectonics structures, all these deformations are compatible with a direction of shortening NNW-SSE in the western Mediterranean.

SOFT-SEDIMENT DEFORMATION STRUCTURES IN THE CRETACEOUS GYEOKPORI FORMATION OF THE BUAN AREA, SW KOREA

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ABSTRACT

The Late Cretaceous Gyeokpori Formation in the Buan area, southwest Korea, shows various types of soft-sediment deformation (SSD) structures. The Gyeokpori Formation is composed of clastic sediments and volcaniclastic sediments under lacustrine environments. In this paper, we examined the logging of outcrops and the investigation of SSD structures in both Dakibong and Jukmak sections, which are corresponded to entire part of the Gyeokpori Formation. The various SSD structures observed at study area that distinguish based on their morphological features as follows: 1) slump related structures including folds, fault and boudins, 2) sediment injection structures such as clastic dikes and rip-down structures and 3) convolute lamination structures. The previous sedimentological studies in respect of the Gyeokpori Formation suggested that the progradation direction are North in Dakibong and South in Jukmak. However, HIM (Hinge Interlimb Method) using slump fold structures show that slump transport directions are ENE in Dakibong and West in Jukmak, respectively. These apparently contradictory results indicate that SSD structures are induced by earthquake rather than rapid sedimentation. In addition, the Gyeokpori Formation is underlain by a volcanic complex of rhyolitic flows and tuffs and is overlain by silicic volcanic successions, and including abundant volcanogenic clasts and sediments in the Formation. It means volcanic activity coincide with lacustrine sedimentation in the study area during the Late Cretaceous. Thus, earthquakes accompanying volcanic activities generate SSD structures in the study area.

THE PHYSICAL EFFECTS OF ACTIVE TECTONICS AND HISTORICAL SEISMICITY IN ANCIENT PORT CITIES OF THE LYCIA REGION (SOUTHWESTERN OF TURKEY)

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ABSTRACT

There are many big faults in Mediterranean Region caused to tectonic movements and earthquakes. For example Aegean, Cyprus tectonic arcs, Plino-Strabo Arcs, Burdur-Fethiye Fault Zone, Aksu Fault etc. Tectonic movements in these faults caused to sea level changes on Mediterranean Sea that had destructive effects in ports and ancient cities. There are many parameters with respect to sea level changes and their physical effects on the coastal areas, but their most important respond is to active tectonic movements and disruptive earthquakes. Phaselis, Myra, Andriake, Patara, Olympos and Kekova are important ancient cities in Lycia Region (Teke Peninsula, Sothwestern of Turkey). Present and ancient sea levels are compared, in the light of the foregoing determined that the sea level changes made important destruction on the ancient cities. These cities were overcome too many big earthquakes. Because of these earthquakes, some parts of these cities are under water at present. Especially 141-142 A.D. earthquake had many devastating effects of ancient port cities. So many buildings turned to ruin with this earthquake. In Phaselis which is an important ancient port city in the Lycia Region, parts of the port structures are under water today due to the earthquakes that took place in ancient times and later on. This indicates that there has been a serious change in the sea level. The relationships between tectonic activities and sea level changes were examined. Also the ancient cities which affected by earthquakes were investigated. In this study, many geological, archaeological and geoarchaeological sources have been used.

MONITORING LANDSLIDES ON SALT DEPOSITS USING GEOPHYSICAL METHODS CASE STUDY SLANIC PRAHOVA

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ABSTRACT

Electrometry is most frequent applied geophysical method to study dynamical phenomena related to the massive salt presence due to resistivity contrasts between salt, salt breccia and geological covering formations. On the vertical resistivity sections obtained with VES devices these three compartments are clearly differentiates by high resistivity for the massive salt, very low for salt breccia and variable for geological covering formations. When the land surface is inclined, shallow formations are moving gravitationally on the salt back, producing a landslide. Landslide monitoring involves repeated periodically measurements of geoelectrical profiles into a grid covering the slippery surface, in the same conditions (climate, electrodes position, instrument and masurement parameters). The purpose of monitoring landslides in Slanic Prahova area, was to detect the changes in resistivity distribution profiles to superior part of subsoil measured in July 2014 and July 2015. Measurement grid include several representative cross sections in susceptibility to landslides point of view. The results are graphically represented by changing the distribution of topography and resistivity differences between the two sets of geophysical measurements. Many profiles were measured with two types of device, Schlumberger and dipole-dipole, which complement each other- first providing an image closer to the geological structure of the subsoil to a depth of 40-45 m from the surface, the second having the advantage of an increased depth investigation to 55 m, in the context of the salt deposit surface investigation and the ascertainment of investigated areas hydrogeological conditions. Geological interpretation criteria for each geoelectric section are adapted to the known geological structure, dominated by a salt lens with important dimensions (length 2700 m, 800 m width, thickness 45-499 m), lens hosted in Miocene "salt formation". From the point of view of electric current propagation, salt massif is infinitely resistive, but not reflected as such on geoelectric section because, on the one hand, the volume nature of the electric field generated in the emission electrodes, and, on the other hand, the fact that the salt itself can be altered or contaminated with conductive particles, in the form of strips on cracks. Salt massive will be reflected by an abnormality of a maximum rezistivity at the bottom of the section.The deposits from the salt roof, clay, marl and sand, are conductive, property increased by loosening the deposits which confers permeability to groundwater movement or infiltration.

This work was supported by a grant of the Romanian National Authority for Scientific Research, CCCDI - UEFISCDI, project number 83/2014

ASSESSMENTS OF CONSOLIDATION TEST PARAMETERS AND INDEX PROPERTIES OF MERSIN SETTLEMENT AREA SOILS

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ABSTRACT

The population of Mersin increases day by day. To make a better master plan to a city, the local soil conditions should be known properly. Settlement amount calculation is very crucial at any engineering project. To calculate it, swelling or compression index parameters which can be obtained from consolidation test is necessary. Sometimes performing that test may not be possible because taking fine grained undisturbed soil sample is hard from borehole, consolidation test takes long time nearly 10 days and the cost of testing equipment is high. Even if all these conditions are suitable, it is not an easy task to perform consolidation test without disturbing the sample. In this study, suggestion of new equations between compression and swelling index parameters and index properties such as liquid limit, plastic limit, plasticity index, initial void ratio and wet density is aimed for Mersin settlement area. To achieve that purpose, a data set which has 58 undisturbed samples is obtained for Mersin City, Turkey. The evaluated soil samples were taken from marine (18) and land (40). The consolidation test parameters and index test parameters at the data set are correlated with simple and multiple regression analyses. By applying multiple regression analysis, equations with high correlation coefficients are obtained. Samples are divided according to Plasticity Chart, more reliable equations are obtained at the subgroups. 40 of the samples, 18 marine and 12 land are closely placed. By using Inverse Distance to a Power method, contour maps are created, so the distribution amounts of the parameters are determined. As the distance from the coast increases, the amount of compression and swelling index parameters decreases.

DETERMINATION OF THE CALCULATION VALUES AND VARIATION RATIO OF THE GEOTECHNICAL PARAMETERS OF THE SOILS WITH HIGH SWELLING AND CONTRACTIONS

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ABSTRACT

In 2008, Romania adopted Eurocode 7, part II, regarding the geotechnical investigations - called SR EN1997-2/2008. However a previous Standard already existed in Romania, using the mathematical statistics in determination of the calculation values, a Norm meeting the requirements of Eurocode, taking into consideration setting the characteristic and calculation values of the geotechnical parameters, was finally issued in Romania at the end of 2010 (NP122-2010 - "Norm regarding determination of the characteristic and calculation values of the geotechnical parameters"). Though the Norm allows use of data already known from an analyzed area when setting the calculation values for a geotechnical parameter, actually this is not possible in Romania, considering that there isn't any centralized system of information coming from the geotechnical studies performed for various objectives of private or national interest. Every company performing geotechnical studies tries to organize its own data basis, but unfortunately it cannot use existing centralized data. When determining the values of calculation, an important role is played by the variation ratio of the characteristic values of a geotechnical parameter. There are recommendations in the mentioned Norm, that could be taken into account, regarding the limits of the variation ratio, but these values are mentioned for Quaternary age soils only, normally consolidated, with a content of organic material < 5%. All the difficult soils are excluded even they keep on existing and affect the constructions foundations on more than a half of the surface of Romania. A type of difficult soil, extremely widespread on the Romania territory, is the contractile soil (with high swelling and contractions, very sensitive to the seasonal moisture variations). This type of material covers and influences the constructions foundations for a third of the territory of Romania. This work is proposing to be a step in determination of limits of the variation ratios for the contractile soils category, for the most used geotechnical parameters in the Romanian engineering practice, namely: the index of consistency and the cohesion.

INFLUENCE OF THE PALAEO-LANDSLIDES ON THE PROJECT OF REHABILITATION OF A NATIONAL ROAD IN THE SOUTHERN CARPATHIAN AREA

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ABSTRACT

The mountain Paduchiosu is part of the Southern Carpathians, in the South-Eastern Bucegi National Park. Significant palaeo-landslides occur on the Eastern slope of the mountain Paduchiosu, affecting the DN 71 alignment, between Valea Dorului and Valea Carpinis, on a length of approx. 10 km. The palaeo-landslides occur along the tectonic contacts of various cretaceous formations. The landslides occur both at the level of Quaternary deposits, constituting the alteration layer of the old geological formations (elluvial, deluvial and colluvial soil deposits), and at the level of Pre-Quaternary geological formations, whose structure is clayey-marl, or within the harder rocky formations, with seams of clayey - marl nature also. Two large palaeo-landslides can be distinguished: landslide I, affecting the national road alignment between pk 96 and 101+500, with sliding orientation towards South and South-West and landslide II, affecting the analysed alignment between pk 102+500 and 106 (with sliding orientation towards East and North-East). The landslides are significant and very old. The main cause of occurence of these landslides is the tectonic nature of the area. The two main landslides occur on large surfaces. Generally, the sliding plan is under the "fissure clay" level, so it tends to be 12 to15 m deep. Numerous reactivations occur within their congestion, on narrow or large surfaces. Many of the reactivations occur due to the malfunctions of the systems of rainfall draining and taking over from the national road that runs South to North on the Southern slope of the mountain Paduchiosu. There are no underground waters, but considering the change of the natural water drainage due to the existing road works, there are areas where the drainage is impeded or slowed, leading to the water infiltration and rocks moistening under the delluvial formation. The local reactivations may also be influenced by the unarranged torrential valleys. The project of rehabilitation of DN 71 is strongly influenced by existence of these significant landslides. Acknowledgement of the risk of landslide and allocation of funds for maintenance and remedial of the arisen damages following reactivations, as well as monitorization of the road areas affected by the landslides both during the works and after their completion, during operation, is the the rightest solution, and actually, the least expensive.

GEOSTATISTICAL ANALYSIS OF SETTLEMENTS INDUCED BY LIQUEFACTION DUE TO TWO MAGNITUDE EARTHQUAKES: CASE STUDY RIVER LIS ALLUVIUMS (PORTUGAL)

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ABSTRACT

Liquefaction is one of the most destructive consequences of earthquakes, causing damages both to buildings and infrastructures. The occurrence of liquefaction depends on the earthquakes factors and on the nature and geotechnical characteristics of the soils. Alluvial soils are susceptible to liquefying when located in regions where earthquakes of magnitude above 5.5 may occur. One way of analysing the effects of liquefaction is to estimate the settlements induced by it. The geotechnical tests, e. g. standard penetration tests, allow to estimate these settlements, although they are point data and for urban planning or disaster management it is of foremost importance to know their spatial distribution. Liquefaction is considered to change in space in a continuous manner, it is not practical to obtain its value point by point. Therefore, geostatistical analysis, more specifically the Kriging method was taken herein to predict the value of the liquefaction potential by computing a weighted average of the known values. Geostatistical analysis have two phases: i) modelling the semivariogram to analyse surface properties and; ii) kriging. In this paper we have used the ArcGIS Geostatistical Analyst where a number of kriging methods are available. The input dataset was explored to examine how the data is distributed and look for global trends. The predictions were assessed based on cross-validation statistics: i) mean prediction error; ii) root mean square standardized prediction error; iii) standard error, and; iv) root mean square prediction error. Two liquefaction maps were obtained, one for an earthquake of magnitude 6 (Mw6) and other for an earthquake of 5.5 (Mw5.5). For the earthquake of Mw6 the best adjustment was obtained with a Gaussian model with no trend removal and for the earthquake of Mw5.5 the best adjustment was obtained with a Gaussian model with a first order function trend removal. In the Leiria region, the probability of occurring an earthquake of Mw5.5 is higher than that of an earthquake of Mw6. Comparatively the resulting settlements are not very different. Areas with larger settlements (> 30cm) decrease from Mw6 to Mw5.5 by about 12%. The settlement class between 20cm and 30cm is the one that occupies the largest area, 48% in the earthquake Mw5.5 and 32% in the Mw6. The danger of settlements depends on the size of the foundations and the nature of the materials used in the construction of the infrastructures. According to EN 1997-1: 2004, in case of normal structures with isolated foundations total settlements up to 5 cm are often acceptable, larger settlements may be acceptable provided the relative rotations remain within acceptable limits and provided the total settlements do not cause problems with slope or with infrastructures that access the structure. The results of this study associated with the survey of the exposed elements will allow to define the risk of the buildings and infrastructures installed in these alluviums. The information generated is of great relevance to stakeholders in order to mitigate the risks associated with liquefaction and post-earthquake settlements.

EVALUATION OF ROCK MASS RATING AND GEOLOGICAL STRENGTH INDEX OF ROCK MASSES AT YADGAR SECTION, NW HIMALAYAS, PAKISTAN

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ABSTRACT

Geological and geotechnical data have been investigated in Sub-Himalayan rock masses along the Yadgar Section for the evaluation of Rock Mass Rating (RMR), Q-Value and Geological Strength Index (GSI). For this purpose rock mass classification system such as RMR, Q-Value and GSI were used to characterize and classify the rock masses. In the study, twenty-five site samples have been investigated at Yadgar section along the Neelum-Muzaffarabad , Azad Kashmir, Pakistan. The result of the study shows that the Abbottabad Formation is vulnerable as compared to other formations because it has very poor rock masses that have less strength of intact rock, very poor quality of RQD and close to very close spacing of discontinuity pattern. In addition, there is probability of mass movement due to the little dripping condition of water. The Hangu Formation and the Kuldana Formation have disintegrated, poorly interlocked, and heavily broken rock masses due to which the GSI of the rock mass is very low. The rock masses of the Lockhart Formation, Margala Hill Limestone and Murree Formation have comparatively higher RMR and GSI and that their mechanical properties also higher. The analysis shows that there is positive correlation between GSI and RMR.

THE IMPACT OF THE DEPTH OF EXCAVATION ON SUPPORT SELECTION: A NUMERICAL MODELLING

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ABSTRACT

The support systems to be used during the tunnel excavation are determined according to the rock mass class obtained from the rock mass classification systems. The most important factor in determining the type of support is the geological and geotechnical characteristics of the unit to be excavated. Until today, empirical rock mass classifications, such as Rock Mass Rating (RMR), Rock Tunneling Quality Index (Q), Rock Mass Index (RMi) were proposed to determine the type and amount of support elements. In these classification systems, discontinuities of the geotechnical unit and the engineering properties of the rock material are used as input parameters, and the type and amount of support elements that must be used is determined. However, the support elements proposed by empirical rock mass classifications are inadequate in some cases or may lead to excessive use of support elements. This is due to the fact that the effect of the overburden is not specified, except for the support pressure, relative to the varying depths. Despite the inevitable revision of the support systems used in the case of increasing stress conditions due to the overburden, supports with the same technical characteristics are generally preferred for different excavation depths in practice. In this study, it was aimed to determine to what depth the support elements obtained from the rock mass classifications could keep standing for the rock mass class that the elements supposed to support. For this purpose, numerical modeling was carried out using a Finite Element Method (FEM) based software (Phase2 v.8.0) in a tunnel of 10 m width, 7 m height, single tube, modified horseshoe shaped taking the different excavation depths into account and using the support systems recommended by the RMR classification system for the fair rock classes. In numerical analyses, the data from real rock masses for varying excavation depths were used. According to numerical analyses results, it is determined that support elements and excavation type of weak rock mass class, which is a lower rock mass, after ~ 250 m overburden, should be used for the fair rock classes.

LANDSLIDE SUSCEPTIBILITY ANALYSIS USING PHYSICALLY BASED MODEL AND FUZZY SET THEORY

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ABSTRACT

Since rainfall infiltration plays a significant role in the instability of slopes, physically based landslide susceptibility analysis has been recognized as an effective analysis approach due to its capacity to reproduce the physical processes governing landslide occurrence. However, one of the difficulties in applying the physically based model to regional study area is that uncertainties caused by spatial variability and incomplete information were involved in the input parameters. Therefore, probabilistic method has been used to quantify these uncertainties. However, the uncertainties caused by lack of information cannot be dealt properly with the probabilistic analysis. In this study, in order to handle uncertainty in the physical model, fuzzy set theory was adopted for regional landslide susceptibility assessment. In addition, Monte Carlo simulation was coupled with the fuzzy approach to evaluate the landslide susceptibility. The proposed approach was used to evaluate the landslide susceptibility for a regional study area, and the analysis results were compared with landslide inventory to evaluate the performance of the proposed approach. In addition, Monte Carlo simulation as the probabilistic analysis and the deterministic analysis are used to analyze the landslide susceptibility for same study area to compare the analysis results of the proposed approach. Based on the analysis results, the fuzzy based approach showed the better prediction accuracy than the probabilistic analysis and the deterministic analysis.

SOME KARST STRUCTURES IN GYPSUM TERRAINS AND THEIR EVALUATION TO BE A GEOLOGICAL HERITAGE

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ABSTRACT

Karst topography is a landscape shaped by the dissolution of a layer or layers of soluble bedrock, usually limestone and evaporites. Karstification in the Sivas basin (Turkey) sculpts beautiful landscapes and this basin has a distinctive beauty for both local people and visitors. Dolines are very special geological landscape formations found in karst regions, and Sivas basin has several giant dolines amongst its thousands of smaller dolines. The Sivas basin constitutes distinctive karst architecture with system of collapse and/or dissolution dolines and caves. Anyone who walks along the shores of a lake occurred by collapse in gypsum terrain in the Sivas basin will be amazed with the lake and rocks that surround them. In this paper, dolines in the gypsum terrain were evaluated and discussed by means of their value as “Geological Heritage”. The tree main importance of dolines such as; scientific, aestetic and ecosystem importance were considered and discussed. Dolines and karstified areas as a representative example of a landform type possess the three attributes to be considered as a Geological Heritage that they demonstrate the effect of erosion on the landform evolution and geomorphic processes are still active, and these types of areas also exposure a range of feature characteristics of a rock unit.

REAL-SCALE EXPERIMENTAL SIMULATION OF URBAN SUBSIDENCE

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ABSTRACT

As urban infrastructure is aging, the possibility of accidents due to the failures or breakdowns of infrastructure increases. Especially, improper construction and aging underground infrastructures like sewer pipes, waterworks, and subway have a potential to cause an urban sinkhole. Urban sinkhole is defined just as a local and erratic collapse occurred by underground cavity due to soil erosion or soil loss, which is separated from a sinkhole in soluble bedrock such as limestone. To identify a mechanism of urban subsidence, we carried out a real-scale experimental simulation of urban subsidence using a buried soil tank with a piping system for water levelling. The soil tank is a box-typed structure made of reinforced concrete, which dimension is 6 x 4 x 2.5 m (L x W x H). The thickness of the wall was designed to be 40 cm to withstand the earth pressure. To control the water level, the floor drainage pipes was installed in the lower part of the soil tank, which are connected to the 4 external water tanks. To create the cavity without the disturbance of the surrounding soils, an ice block was placed on the bottom and then the soil tank was filled with soil. A field density test was performed after completing the preparation of specimens through compaction of soil layer. The cavity was formed by melting the ice block using hot wire and steam ice, and the cavity formation was confirmed by using endoscopic camera and temperature sensor. GPR survey and 3D displacement measurement based on MEMS were applied to observe each subsidence phase under the various conditions including soil layers thickness, grain size distribution, groundwater level, degree of compaction, etc. Real-scale experimental simulations were carried out assuming the existence of cavities due to soil loss. The ground compaction in the process of cavity formation increased the arching effect around the cavity which was created from the molten ice block. As a result of measuring ground displacement and groundwater level at the same time, groundwater was found to be a major factor causing ground subsidence. The rise of the groundwater level saturates the ground around the cavity, which decreases the effective stress in the layer. As a result, the decreasing of the effective stress causes the continuous cavity collapse and the upward migration of the underground cavity.

COMBINING GEOLOGY AND SITE INVESTIGATION FOR A SMALL ENGINEERING PROJECT ON SOFT SOILS

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ABSTRACT

The identification, characterization and discussion of the geological conditions relevant for the construction of a wastewater treatment plant, located on the alluvial flood plain of the Mondego river, Portugal, are presented. Despite the small budget for the project, the characterization of the site's engineering geology and the construction of the engineering structure were successfully achieved. The good results were based on the strong contribution of the site geology study and on the site investigation, which provided an understanding of the relevant geotechnical conditions to optimize the design and construction of the structure without compromising safety and efficiency. A conceptual engineering geology model was developed based on surface geology reconnaissance and was essential to concentrate the site investigation works in the centre of the engineering structure. A single piece of equipment was selected that was able to perform Seismic Cone Probing Tests with Pore Pressure (SCPTU), Dynamic Probing Super Heavy Tests (DPSH) and borehole augering. The surface geological reconnaissance and the site exploration permitted the engineering geology interpretation. Alluvial soils above the bedrock and over-consolidated topsoil at the surface were identified. The upper brown clay layer has the lowest strength and the highest deformability of the alluvium. Sand intercalations were identified as result of a stronger flow or higher gradient in the river. To prevent flooding of the plant during construction and operation, and to minimize the geotechnical problems associated with the construction of a 5 m deep, large concrete tank, it was decided to implement a 2.4 m height fill to create a suitable and always dry platform, with enough bearing capacity for the operation of the heavy construction equipment. The fill provided a safer and cheaper construction option, also reducing the risk of the concrete tank becoming buoyant during high floods. The liquefaction potential was evaluated and the results showed that the susceptibility to liquefaction is low at the surface, increasing to moderate in the deepest alluvial soils. The computed settlements of 0.8 m at ground level and the low to moderate liquefaction potential of the alluvial soft soils proved to be unacceptable foundation conditions. Moulded concrete piles were selected to carry the weight of the engineering structures down to the bedrock and the wastewater treatment plant was relocated as close as possible to the alluvial valley edge, in order to reduce the thickness of the piles. The final engineering geological model, based on in situ data, complemented the anticipated scenario and confirmed that the assumptions used in the site investigation were quite suitable for the project. The information obtained during the construction of the molded piles confirmed the geotechnical zoning initially proposed.

ENGINEERING GEOLOGICAL STUDY OF HIGH-SPEED RAIL ROUTH BETWEEN TASUCU-MERSIN, TURKEY

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ABSTRACT

Antalya and Mersin are two neighbor cities whose centers are furthest from each other in Turkey. Due to the Taurus Mountains along the coast, some parts of the coast have very sharp morphology and road transport between these two cities is long and sometimes dangerous. For this reason, the mandatory requirement for a "high-speed rail", one of the modern transportation methods, is very old in the Mediterranean region. Obviously, such a project will contribute to the development of tourism, agriculture and trade throughout the region. This "high-speed rail routh" has been examined in 3 steps considering morphological, engineering and geotechnical characteristics of the region and population distribution; Antalya - Gazipasa, Gazipasa - Tasucu ve Tasucu - Mersin. The project has been planned double line between Antalya - Gazipasa and Tasucu - Mersin, single line between Gazipasa - Tasucu. Additionally, because of "the plains are national wealth", high-bridges are preferred instead of huge fills. Thus, the most appropriate system is "monorail" which does not include any huge fills. In this study, geotechnical and engineering geological investigations of the last stage of the project between Tasucu and Mersin are presented. The routh has passed a soft topography in this last section (Km 333+100 - 401+750) of the project which is approximately 402 km in length. The high places have been formed by Miocene aged sediments (Mit). The main components of Miocene aged sediments are sandstone, claystone, calcareous mudstone and clayey limestone. The main type of discontinuity is bedding. The bedding is usually horizontal outside of the fault zones and in the middle of the basin. In the sections where the evaporation is at a high level, hardpan (CaCO3 condensation) is formed. Sandstone levels are classified as weak to medium strength. At calcareous levels, strength can be increased depending on calcareous ratio. Alluviums are observed in the plains and valley bases. The Plio-Quaternary aged caliche (Pl-Qk) is located in the last part of the project, around Mersin (Km 375 + 000 - 401 + 750). It has a massive appearance and is composed of hardpan with a medium strength and softpan with a high plasticity. The engineering properties of the unit, which is composed of soft levels on the top and hard on the bottom, provide significant changes in the vertical section while the hard portion is relatively more resistant. There are no tunnels in this section. However; cuts with different lengths and depths, bridges with different lengths and heights are also included. The major structures in this section are given below: Location Geological Lengths Heights/Depths (Km) Units (m) (m) Viaduct 349+100 - 349+500 Mit 400 34 352+800 - 354+300 Mit 1500 20 377+050 - 378+100 Pl-Qk 1050 29 Cut-and-cover 347+300 - 349+100 Mit 1800 41 349+500 - 350+400 Mit 900 36 354+300 - 357+480 Mit 3180 38

THE APPLICATION OF THE LIMIT EQUILIBRIUM AND NUMERICAL METHODS IN SLOPE STABILITY ANALYSES

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ABSTRACT

Stability analysis is one of the most important part of many engineering studies. Whether to determine if the excavated slopes are stable in areas where engineering structures are built, the geotechnical characteristics of the unit to be excavated are analyzed and safe slope design is carried out. There are many methods preferred by engineers in slope stability analysis. The most preferred of these methods are limit equilibrium analyses such as Janbu, Bishop, Spencer, and Fellenius. In addition to these analyzes, numerical analyses have also been frequently used in recent years. In this study, Düzçam Dam (Karabük / Turkey) spillway construction site was selected as study area. In the first stage, boreholes drilled and pressuremeter tests were performed. In addition, unit weight, uniaxial compressive strength of the talus and flysh were determined by laboratory studies. Slope stability analyses at the site of the spillway were carried out by using the data obtained from both field and laboratory experiments. Firstly, in the limit equilibrium analyses fulfilled according to the Janbu and Bishop methods, the safety factor values of the talus were determined lower than 1.0. This indicates that the talus should be erased from the spillway construction area. After excavation, the slope of the spillway construction site was designed as multiple bench system of 1/2. Taking the new slope design into account stability analyses were carried out using both limit equilibrium analyses and finite elements method (FEM) based Phase2 7.0 software. The safety factors determined by the analyses were higher than 1.0 and this indicates that the designed slope of the spillway site will be stable.

THE IMPACT OF EXPOSURE TO PRESSURE OF 50 MPA ON THE SPECIFIC SURFACE AREA OF CLAY

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ABSTRACT

Paper presents results of laboratory tests conducted to determine the impact of pressure of 50 MPa on specific surface area of clay. Samples for the tests were selected from neogenic clay, which contains over 60% of clay fractions. The influence of pressures exceeding 50 MPa (reaching several hundred MPa) on clay soils has not been sufficiently identified and described so far. These studies constitute one of the stages in the research program carried out by the author, concerning identification of the impact of high pressures (from 50 MPa to 400 MPa) on the physicochemical and mechanical properties of fine-grained soils. These tests were carried out in an original, high-pressure test stand. The specific surface area was determined by the methylene blue adsorption method. The specific surface area of clay extracted directly from an open pit mine was compared with the specific surface area of the same clay subjected to the pressure of 50 MPa in a high-pressure chamber. The study found that the specific surface area of the clay subjected to the pressure of 50 MPa increased distinctly by over 35%. It was recognised, that the rise was an effect of changes in the microstructure of clay particles and microstructural alteration in the soil skeleton.

PROPOSING SINKHOLE INDICATORS USING LABORATORY TANK MODEL TESTS

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ABSTRACT

Urban sinkholes can be occurred due to internal erosion, soil loss, water infiltration into the ground and soluble rocks in a karst area. The urban sinkhole is also related to groundwater development. Aging underground infrastructures are exposed at risk, resulting in severe economic loss. In order to mitigate the urban sinkhole risk, a proper monitoring and an early warning system should be proposed. To understand the sinkhole mechanism, a small-size tank model (30 cm × 5 cm × 20 cm) is designed. In this paper, the materials tested are a commercial sand package, which is produced in Korea, having mean grain size of 0.6 mm and rounded shapes. Three layers are made and each layer was tamped mannualy. A modelled sinkhole is triggered by the water from the bottom of tank with low infiltration rate. According to the test results, the variation in groundwater level at the relative density of compacted sand is essential, because the size and shape of sinkholes are mainly influenced by soil-water interaction. Geotechnical factors are also monitored to examine the sinkhole characteristics: the variations in pressure, suction stress, temperature, electrical conductivity and water contents are main concern. The elapsed time of upward migration, size and shape of underground cavity are affected by the groundwater level. The moment of collapse is also significantly related to an abrupt change in pore pressure while temperature and water content changes seem to be less related to the collapse. We suggest, therefore, the groundwater level in the ground should be preferentially investigated for assessing the sinkhole risks. In addition, sinkhole can be triggered by various causes. Rainfall events during summer seasons can create flow paths and cause underground instability. The linkage between cavity expansion and rainfall intensity will be highlighted. The rainfall-induced sinkholes is also shortly discussed in the future study section.

USE OF CIRCULAR ELECTROKINETIC UNIT IN STABILIZATION OF SOFT SOILS

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ABSTRACT

Electrokinetic stabilization, which is a developing soil improvement technology, involves supply of a stabilization agent to low-permeability soils under application of direct current. In this study, a circular electrokinetic unit having 9 electrode rods instead of a conventional rectangular unit with 2 plate electrodes was used to improve strength of soft soils. Experiments with three different configurations were carried out for 10 days with application of 10V. In all of the experiments CaCl2 was used as a stabilizing agent but the position of the anode in the electrokinetic unit was changed. In the first experiment, anode was placed in the central compartment in order to minimize areal coverage of acidic conditions and hence to increase areal coverage of basic conditions in which stabilization takes place. In the second and third experiments, anode was placed in the peripheral compartment to provide higher amounts of CaCl2 to the soil. In the third experiment, beside CaCl2, Ca(OH)2 was also supplied to the anode compartment to start with a higher pH. In the first experiment, strength increase was obtained only in the areas close to cathode compartment. In the second and third experiments, however, strength was increased in all regions reaching up to 137% and 123% respectively in areas close to cathode compartment. These results showed that in order to obtain strength increase throughout the soil sample anode should be positioned within the peripheral compartment.

SLOPE, SCARP AND SEA CLIFF INSTABILITY SUSCEPTIBILITY MAPPING FOR PLANNING REGULATIONS IN ALMADA COUNTY (PORTUGAL)

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ABSTRACT

In Portugal, the modifications introduced in 2008 and 2012 in the National Ecological Reserve law (REN) included the mandatory study of slope instability, including slopes and natural scarps, and also of sea cliffs, at municipal or regional scale, with the main purpose of to avoid the use of hazardous zones with buildings and other structures. The law also indicates specific methods to perform these studies, with separate approaches for slope instability, natural scarps and sea cliffs, with the areas included in the REN being object of severe land use restrictions. In this paper area presented the methods used to produce the maps required by REN law, with modifications and improvements to the law specified methods, applied to the 71km2 territory of Almada municipality, which included: 1) Slope instability assessment and mapping using the statistically based Information Value method with results validated with the landslide inventory using ROC curves, which provided an AAC=0.964, with the higher susceptibility zones which contain at least 80% of the landslides of the inventory to be included in REN map. The map was object to a generalization process to overcome the inconveniences of the use of a pixel based approach. 2) Natural scarp mapping including set back areas near the top, defined according the law and set back areas near the toe defined by the application of the shadow angle calibrated with the major rockfalls which occurred in the study area; 3) Sea cliffs mapping including two levels of setback zones near the top, and one setback zone at the cliffs toe, which were based on systematic inventories of cliff failures occurred between 1947 and 2010 in a large scale regional littoral monitoring project. In the paper are described the methods used and the results obtained in the assessment and mapping of those three hazard generating morphological features and respective setback lines, to generalize the maps to enable the production of outputs suitable for planning and land use management, witch correspond to the final maps of areas to include in REN. The results obtained in this study may be considered as an example of good practice of the municipal authorities in terms of solid, technical and scientifically supported regulations definition, hazard prevention and safe and sustainable land use management.

This publication is supported by FCT-project UID/GEO/50019/2013 - IDL. It is also acknowledged the collaboration of Câmara Municipal de Almada, namely of Eng. Catarina Freitas, Dr. Nuno Lopes, Dr. Patrícia Silva and Dr. Sara Dionísio.

HOW DOES THE TYPE OF WATER AFFECT SWELLING BEHAVIOR OF CLAYS?

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ABSTRACT

In the design of the foundations of the structures, especially light buildings, on clayey soils, the main soil behaviors to be considered are swelling properties and heave on the surface as a result of soil expansion. That's why, during investigation of such soils and light structures on it, determination of swelling properties by means of swell percent and maximum swell pressure, and estimation of the surface heave has a great importance. In order to obtain swelling parameters of clayey soils, there have been laboratory experimental tests which were standardized. Distilled water is generally used during these experimental tests, however the soils in-situ are interacted with different type of water having different water chemistry. So, swelling behavior of expansive soils tested with distilled water would be naturally different than the behavior of expansive soils tested with different water type and chemistry. For example, water sourced and interacted with carbonate rocks, evaporate, magmatic rocks, etc. are different by means of their chemistry. Moreover, water chemistry shows variations in locations closer to the sea and/or lake where sea and/or lake water intrusion into the soil is exist, and it is possible to give more examples. That's why, it is thought that the anticipation of the realistic soil behavior is needed the use of water, same with the water in-situ condition which will interact with the soil environ, in laboratory swelling experiments. In this study, the effect of the water type and chemistry on swelling behavior of the clays was investigated

VOLCANIC AGGREGATES FROM AZORES AND MADEIRA ARCHIPELAGOS (PORTUGAL): AN OVERVIEW REGARDING THE ALKALI-SILICA REACTION

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ABSTRACT

Alkali-silica reaction (ASR) is a kind of deterioration that has been causing serious expansion, cracking and durability/operational issues in concrete structures worldwide. The presence of sufficient moisture, high alkali content in the cement paste and reactive forms of silica in the aggregates are the required conditions for this reaction to occur. Reactive aggregates of volcanic nature have been reported in different countries like Japan, Iceland and Turkey, among others. The presence of silica minerals and SiO2-rich volcanic glass is regarded as the main cause for the reactivity of volcanic rocks. In Portugal, volcanic aggregates are mainly present in Azores and Madeira Archipelagos and, for several years, there was no information regarding the potential alkali-reactivity of these rocks. Since the beginning of this decade, some data was obtained by the work of Medeiros (2011) and Ramos (2013) and by the national research projects ReAVA (Characterization of potential reactivity of the volcanic aggregates from the Azores Archipelago: implications on the durability of concrete structures) and IMPROVE (Improvement of performance of aggregates in the inhibition of alkali-aggregate reactions in concrete), respectively. In order to investigate the potential alkali-reactivity of aggregates from both archipelagos, a total of sixteen aggregates were examined under the optical microscope and, some of them, also under the Scanning Electron Microscope with Energy Dispersive Spectroscopy. A set of chemical analyses and laboratory expansion tests were also performed on those volcanic aggregates. The main results showed that the presence of volcanic glass is rare in both archipelagos and that the samples of Madeira Archipelago contain clay minerals (mainly from scoria/tuff formations inter-layered with the lava flows), which can play a role in concrete expansion. The results of the laboratory tests showed that one of the samples performed as potentially reactive in the accelerated mortar-bar test (ASTM C 1260) and that the majority of the Azores samples started to show some expansion after one year of testing in the concrete prism test (CPT) at 38ºC. Based on the expansion limits commonly used in national standards and specifications, it was concluded that the majority of the samples are considered non-reactive in all the methods used. However, some of the samples can be considered as potentially reactive from the petrographic point of view, while there are some issues regarding the long-term behaviour of those volcanic aggregates when submitted to the CPT that need to be clarified.

POTENTIALLY REACTIVE FORMS OF SILICA IN VOLCANIC ROCKS USING DIFFERENT ANALYTICAL APPROACHES

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ABSTRACT

Several concrete structures show signs of deterioration resulting from internal chemical reactions, such as the alkali-silica reaction (ASR). It is well-known that these swelling reactions occur in the presence of moisture, between some silica mineral phases present in the aggregates and the alkalis of the concrete, leading to the degradation of structures and consequently compromising their safety. In most of the cases, rehabilitation, demolition or even rebuilding of such structures is needed and the effective costs can be very high. Volcanic rocks are commonly used as aggregates in concrete, and they are sometimes the only option due to the unavailability of other rock types. These rocks may contain different forms of silica that are deleterious to concrete, such as cristobalite, tridymite, opal, chalcedony and micro- to cryptocrystalline quartz, as well as Si-rich volcanic glass. Volcanic rocks are typically very fine-grained and their constituting minerals are usually not distinguished under optical microscopy, thus leading to using complementary methods. In the present work twelve samples of volcanic rocks have been selected from different areas worldwide. The samples selection was based on their potential reactivity in order to compare the results obtained by petrographic examination and the chemical tests with the performance in concrete. The objective of this research is to find the more adequate analytical methods to identify silica phases that might be present in volcanic aggregates and cause ASR. The complementary methods used include X-Ray Diffraction (XRD), chemical analyses, mineral acid digestion and Scanning Electron Microscopy with Energy Dispersive Spectrometry (SEM/EDS), as well as Electron Probe Micro-Analysis (EPMA). The phosphoric acid method showed to be very useful for volcanic rocks, as it revealed reactive silica phases that were not observed under microscope, due to the very fine granularity of this type of rocks and to the very low content of these components in the rocks.

ASSESSMENT OF THE ALTERATION OF GRANITIC ROCKS AND ITS INFLUENCE ON ALKALIS RELEASE

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ABSTRACT

There are two main types of internal expansive chemical reactions that can affect the durability of concrete: internal sulphatic reaction (ISR) and alkali-aggregate reaction (AAR). In AAR two types of reactions are generally considered: alkali-silica reaction (ASR) and alkali-carbonate reaction (ACR). Alkali-silica reaction (ASR), the most common AAR, occurs between the alkali hydroxides released during the hydration of cement, or released from the aggregate particles, with different forms of reactive silica present in aggregates. Although granitic aggregates are usually considered unlikely to be reactive to alkalis, some studies have been developed which showed that this is not always the case. Granites contain feldspars, quartz and mica as the main components and are classified as alkali slowly reactive, since structures with these aggregates can present manifestations of ASR decades after being built. The features that can be identified by petrographic analysis and which are supposed to contribute to the potential alkali reactivity of these rocks are deformed quartz with undulatory extinction, strain lamellae and ribbon texture, bulging and sub-graining. In addition, porosity and microcracks can play a role by promoting the circulation of fluids in the interior of the aggregate particles. Besides the presence of potentially reactive silica, research developed in Canada demonstrated that some minerals can release alkalis to the concrete interstitial solution therefore increasing the total alkalis content of concrete and eventually contributing to ASR. Granitic quarries are usually heterogeneous, containing rocks with variable degrees of alteration. Four granitic aggregates were selected for this work which is focused in two interrelated subjects, namely, it aims to determine the content of alkalis released by some Portuguese granites; and to define the influence of the degree of alteration of the rocks on the capacity to release alkalis. The alteration features were evaluated by image analysis in order to stablish classes of alteration. Two alkaline solutions were employed: NaOH 0.7M (for the evaluation of the K supply) and KOH 0.7M (for the Na supply). Twice a week, during 26 weeks, the test containers were gently rolled back for about 10 seconds, and a sample was taken from the test solution to be analysed by AAS, after filtration and acidification. It was concluded that natural alteration reduces dramatically the releasable alkalis available in the rocks.

QUALITY IMPROVEMENT OF GROUND WORKS PROCESS WITH THE USE OF CHOSEN LEAN MANAGEMENT TOOLS - CASE STUDY

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ABSTRACT

Ground works are one of the first processes connected with erecting structures. Based on ground conditions like the type of soil or level of underground water different types and solutions for foundations are designed. Foundations are the base for the buildings, and their proper design and execution is the key for the long and faultless use of the whole construction and might influence on the future costs of the eventual repairs (especially when ground water level is high, and there is no proper water insulation made). Article presents the introduction of chosen Lean Management tools for quality improvement of the process of ground works based on the analysis made on the construction site of vehicle control station located in Poznan, Poland. Processes assessment is made from different perspectives taking into account that 3 main groups of workers were directly involved in the process: blue collar-workers, site manager and site engineers. What is more comparison is made on the 3 points of view to the problems that might occur during this type of works, with details analysis on the causes of such situation. Authors presents also the change of approach of workers directly involved in the mentioned processes regarding introduction of Lean Management methodology, which illustrates the problem of scepticism for new ideas of the people used to perform works and actions in traditional way. Using Lean Management philosophy in construction is a good idea to streamline processes in company, get rid of constantly recurring problems, and in this way improve the productivity and quality of executed activities. Performed analysis showed that different groups of people have very different idea and opinion on the problems connected with executing the same process -groundwork and only having full picture of the situation (especially in construction processes) management can take proper problems-preventing actions that consequently can influence on the amount of waste generated on the construction cite which positively influence on the external environment.

INTERPRETATION OF GEOPHYSICAL SURVEYS AND SHALLOW SOIL PROFILES, GÖLOVASI, YUMURTALIK COUNTY, ADANA PROVINCE, TURKEY

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ABSTRACT

The interpretation of the electrical resistivity and seismic refraction surveys with core drillings in the seismically active district of the Gölovasi location at the Yumurtalik County of Adana Province was evaluated within the scope of this study. Seismic refraction surveys, comprising four lines at selected site, were undertaken to determine the bedrock profile, identify changes in bedrock seismic velocity and then to highlight the depth of bedrock and indicate the presence of faults, fractures, lineaments etc. present within the investigated section. Therefore, elastic parameters of the soil/rock were determined. 2D electrical resistivity tomography (ERT) technique was then applied for site investigation. The ERT profiles mostly shows a lower resistivity zone (<19.00 ohm.m), which coincides in surface with the Tertiary sedimentary rocks where a relatively high resistivity zone continues into the subsurface at depths greater than 80 m. 12 boreholes were drilled to recover undisturbed and disturbed samples for laboratory testing in order to investigate the subsurface conditions with a total depth of 505.00 m. Finally, rock mass and active structural properties were identified with specific lithology and stratigraphy. Assigned parameters are only to indicate the variation in engineering behaviour of the bedrock.

MINERALOGICAL CHANGES IN A MONTMORILLONITE CLAY TREATED WITH LIME COLUMN

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ABSTRACT

Type and amount of clay minerals has the most important role in swelling behaviour of clay soils. Montmorillonite is one of the clay minerals which have high swelling potential. For treatment of swelling soils, lime column technique is one of the most common and economic methods accepted in international literature. The main purpose of lime column technique is to improve the surrounding soil with time as a result of clay-lime reactions. These reactions cause changes in mineralogy of the soil and accordingly cause the clay soil to have less swelling potential. This paper aims to examine mineralogical changes on a soil which is comprised dominantly of montmorillonite after lime column treatment. For this purpose, the mineralogy of samples which taken from different distances from the column was identified by X-Ray Diffraction (XRD) technique. The results of the study were discussed and performance of the lime column was evaluated.

NOTES ON ENGINEERING GEOLOGY STUDIES FOR RAILWAY ORE TRANSPORT PROJECTS

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ABSTRACT

The work presents the main objectives, methodology and tasks of the engineering geology studies for railway projects for ore transportation since planning, design, construction and operation. These railways are usually single track with crossing yards, with a circulation speed generally not exceeding 80 km/h and the transportation being done by quite long compositions with high load by axle. As main characteristics of this type of project can be listed: - the high extension of the works; - the diversity of the geological formations and of the topography crossed; - the geometrical requirements layout (horizontal curve radius above 400 m and longitudinal gradient below 2,5%); - the distribution of the heavy loads along the rails, sleepers and ballast and the high intensity of dynamic loads. Geology and topography aspects are of the greatest importance, due to the need to adjust the design to the local conditions for the construction of large embankments, excavations, bridges or tunnels, which makes these projects very complex, time-consuming and costly. The preliminary geological reconnaissance of the terrain has extreme importance for the definition of alternative routes and the viability of the work. After the selection of the final route, detailed geological mapping, in situ geophysical prospection and mechanical exploration campaigns are carried out and laboratory tests are performed. It is sought to progressively increase the level of knowledge throughout the development of the project studies, using progressively more elaborate and time-consuming research methodologies and tests. Attention is drawn to the fact that each type of work (excavation, embankment, bridge or tunnel) has different technical requirements. The geological and geotechnical units crossed by the railroad must be defined as well as their geomechanical properties. The geotechnical zoning is defined considering the representative average parameters. The design work is usually divided in several projects parts such as excavations, earth fills, bridges, viaducts and tunnels. The definition of the specifications of the works to be carried out and the preparation of all the technical reports with all geological and geotechnical information of the project, suitable for construction, are prepared. In the construction phase, special attention should be paid to the validation of the geotechnical data and to the geotechnical cartography of the exposed surfaces, to verify possible differences between the design and the terrain, to carry out the necessary adjustments, especially for tunnels where the discrepancy between the data obtained in the design and in the construction phase may be larger. The primary objective of the geological-geotechnical studies is to know the nature and the geotechnical behaviour of the terrain that will receive the new railroad, a linear infrastructure, crossing diverse geological formations and variable topography, where in addition to the earthworks it will be necessary to build special works requiring specific studies, quite detailed and diversified. All the activities carried out during the engineering geology studies must be aimed at avoiding the occurrence of geotechnical problems, increasing safety and influencing the construction schedule and costs as well as an efficient operation of the railway.

SUGGESTIONS FOR ENERGY LINE ANGLE SELECTION ON ESTIMATING ROCKFALL SUSCEPTIBILITY

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ABSTRACT

Rockfall is a phenomenon that frequently occurs in the mountainous areas and threats vital elements such as settlements, highways, infrastructures etc. The cone propagation approach is a method widely used in determining the rockfall run-out distances and in susceptibility mapping at a regional scale. This method uses source area map, Digital Elevation Model (DEM) and energy line angle (ELA) as inputs and it is based on the principle of determining the possible propagation zone on DEM. The ELA varies according to parameters such as the topography, the geological characteristics of the slope surface and the block shape. Therefore, it is aimed to develop a method which considers these variables to a certain extent in the selection of the ELA. For this purpose, some fieldworks were done and DEMs were created for Kargabedir Hill and Sivrihisar rockfall pilot areas. The propagation zones for different energy line angles were produced from the DEMs by cone propagation approach and the positions of the fallen rock blocks were determined at these pilot areas. Also, the blocks located in the boundaries of the propagation zones were counted and a relationship between ELA and block distributions was determined. Based on this relationship, several curves were drawn compatible with the data in this study and the literature. The ELAs can be predicted from these curves for five different susceptibility classes as very low, low, medium, high and very high to prepare the susceptibility map. In addition, to determine which curve to select A Run-out Distance Rating (RDR) chart was proposed to considering the block shape, block angularity, friction of the slope surface and coefficients of normal and tangential restitution. Finally, the ELA values were determined from these curves and susceptibility maps were prepared for the two pilot areas. This rockfall susceptibility approach is preliminary and open to improvement by verifying with more evidence.

ROLE OF WATER IN TRIGGERING LANDSLIDES IN GREAT KABYLIA (TIZI-OUZOU, ALGERIA)

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ABSTRACT

Landslides in marl formations are widespread in Algeria, particularly in great Kabylia. Indeed the morphology of the North of Algeria, essentially characterized by mountains and steep slopes, often gives rise to landslide of variable intensity. Water play a central role in the landslides processes in this region; it exerts on these soils a special influence which translates into several instabilities. This communication aims to the study of the impact of ground and surface water on the triggering of landslides in great Kabylia and numerical modeling of these instabilities caused by water in its various forms. The increase of the water content of ground is usually closely linked to the weather conditions: It is due mostly to seepage or groundwater lifts following the heavy or prolonged rainfall, at which can be added the snowmelt. Landslides in great Kabylia (Ain el Hammam, Azazga, Tigzirt, Illilten, Tala Tgana, Azeffoune … etc.) occurred or reactivated following the heavy rains and melting snowpack especially since winter 2012. If one must more often attributed the increase in water content of ground to natural causes, it also happens to be anthropogenic due to the presence of man and his activities (leakages, the rupture of underground pipes, concentration of water discharges after a waterproofing surfaces, abandonment of water sources, unplanned urbanization). The results of this study show the need to the realization of ground and surface runoff water management system (drainage systems blanked, bad raccordment in systems supply of potable water, the return to the use of water sources in mountains to reduce the pressure exerted by the ground water).

ON THE MODELLING AND MAPPING OF THE COLLAPSE SUSCEPTIBILITY IN GYPSUM TERRAIN

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ABSTRACT

The modelling and mapping of the susceptibility of the collapse in gypsum terrain is very crucial, and in herein this article usefulness of artificial neural network (ANN) is presented as a case study in Sivas (Turkey) basin in regional scale. As the first stage of the modelling, Digital Elevation Model (DEM) was constructed in GIS environ, and then maps of the geological, hydrological topographical, land use and vegetation cover parameters playing a role in collapse were then produced. These parameters were lithology, tectonic activity, drainage systems, springs, slope angle, slope aspect, elevation, distance from roads and settlement areas, vegetation cover. As the last stage of the analyses, collapse susceptibility map was constructed using the ANN model, and the validation of the model were then discussed. As a result of the study, high accuracy of modelling was obtained, and validation showed that the constructed map from ANN model looks like accurate. It can be concluded that the ANN model can be used as a tool in assessment of the collapse susceptibility in gypsum terrains.

FallGIS COMPUTER PROGRAM AND MAPPING OF KINEMATICALLY CONTROLLED LANDSLIDES

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ABSTRACT

In this study, a procedure for producing kinematically controlled instability map using FallGIS computer program in GIS package in a route is suggested. This study aims to determine the potential slope stability problems, kinematicaly controlled, of rock slopes along the railway line during line extending works and after. The investigation comprised three stages: field and office works and laboratory testing. Initially rock masses where the slopes take place were identified geologically, and joints were then evaluated by means of rock mass properties and kinematic slope instabilities. Thereafter, fresh rock samples were obtained from various representative locations and geo-mechanical properties of rock samples were determined by means of laboratory testing. Slope stabilities in the study area were evaluated by means of kinematic analyses and potential directions and locations for different instabilities such as planar, wedge and toppling were determined. Kinematic analyses showed that the potential slope instabilities of rock slopes in the study area are in two main directions of SW and SE. Critical slope angles for planar, wedge and toppling failure are respectively 65°, 52° and 50° for appropriate direction of slope. As a last stage of the study, potential slope instability regions were mapped, and slopes along the railway line having a risk to failure were also shown on the map.

LABORATORY INVESTIGATION OF BURIED PIPES USING GEOGRID AND EPS GEOFOAM BLOCK

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ABSTRACT

This paper describes the results of laboratory tests conducted on flexible PVC pipes with diameter of 160 mm, buried in unreinforced and reinforced trench with geogrid layer and expanded polystyrene (EPS) geofoam block. The repeated load with amplitude of 450 kPa and frequency of 0.33 Hz was applied on the trench surface, using plate loading at a diameter of 150 mm to simulate the vehicle loads. Vertical diameter strain (VDS), strain at pipe's crown and transferred pressure on the pipe's crown were recorded throughout the test for up to 500 cycles of loading. The variables examined in the testing program include thickness of EPS block (30, 60 and 100 mm) and its density (10, 20 and 30 kg/cm3). The pipes were embedded at depths 1.5 times their diameter and the width of EPS block was kept constant at 2.0 times the pipe diameter in all tests. The results show that the values of VDS and pipe strain increased rapidly during the initial loading cycles, thereafter the rate of deformation and strain reduced significantly as the number of load cycles increased. According to the results, the minimum VDS and pipe's crown strain were provided by 100 mm thickness and 30 kg/cm3 of EPS block placed over the pipe with a geogrid layer giving values of, respectively, 0.15 and 0.10 times those obtained in the reinforced trench with a geogrid layer.

INFLUENCE OF ANISOTROPIC PARAMETERS OF DISCONTINUITIES FOR MODELING A FRACTURED ROCK MASS. CASE OF KHERRATA TUNNEL (ALGERIA)

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ABSTRACT

The objective of our work is to verify the stability during excavation tunnel work in the rock mass from the finite element method taking into account the anisotropy due to the existing discontinuities through the rock joint model (Plaxis 3D). The characterization methods through the Q system (method of Barton), RMR (Bieniawski classification) and GSI (Geological Strength Index) allowed us to conclude that the quality of rock mass of our site is average in limestone, and poor in fractured limestone. Then modeling of excavation phase using the finite element method (Plaxis 3D) with parameters from the recommendations of classification: average stand up time, span dimension, cohesion of rock mass and angle of internal friction of rock mass; and the rock joint model allowed us to conclude that the stability is verified despite the difficulty to obtain the parameters of the constitutive model relating to anisotropy

MODELING AND ANALYSIS OF THE EXCAVATION PHASE BY THE THEORY OF BLOCKS METHOD OF TUNNEL 4 KHERRATA GORGE (ALGERIA)

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ABSTRACT

The aim of our work is to check the stability during excavation tunnel work in the rock mass of Kherrata, connecting the cities of Bejaia to Setif. The characterization methods through the Q system (method of Barton), RMR (Bieniawski classification) and GSI (Geological Strength Index) allowed us to conclude that the quality of rock mass is average in limestone, and poor in fractured limestone. Then modeling of excavation phase using the theory of blocks method (Software UNWEDGE) with parameters from the recommendations of classification allowed us to check stability and to finally conclude that the use of geomechanical classification and the theory of blocks can be considered reliable in preliminary design

AN ANALYSIS OF CORRELATION BETWEEN SEWER INTEGRITY AND GROUND SUBSIDENCE

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ABSTRACT

Recently, the phenomenon of ground subsidence and sinkhole openings in urban area has caused social problems such as damage to roads and structures, fear to public, and property loss. A survey released by the City of Seoul has showed that more than 80% of the phenomenon of ground subsidence occurred mainly around sewerage. But the sewerage replacement or reinforcement just has been decided by burial year, and the risk of subsidence was not taken into consideration. In this study, to evaluate the risk of ground subsidence risk around the sewer, the items related to the ground subsidence risk were extracted. There are 6 items in total, including type of pipe, diameter of a pipe, buried year, removal system, lane passage number, and maintenance control. AHP analysis was carried out to estimate the weight of each item. The factors affecting the occurrence of subsidence were analyzed in terms of buried year -> type of pipe -> maintenance control -> lane passage number -> removal system -> diameter of a pipe. As a result of the evaluation of the sewage line condition of the pilot district, the result of the state evaluation of the place where the actual sinkhole occurred is dangerous. Therefore, the proposed method and the weights are valid. In this study, a subsidence risk evaluation method using sewerage effective data was proposed. for the constructing effective factor, the sewerage data was extracted nearest ground subsidence occurred place in the City of Seoul, and analyzed a correlation between subsidence and sewerage. The effect weight was given through AHP analysis and applicability was verified by comparing the actual subsidence data with the risk evaluation in the sample area.

STOCHASTIC MODELLING OF THE HYDRAULIC ANISOTROPHY OF ASH IMPOUNDMET SEDIMENT

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ABSTRACT

In the case reported here the impoundments of a 400 MW coal heated power plant with an annual production of about 1,5 million tons of fuel ash are of the cross-valley type, operated by the simple and cheap "upstream method". The aim of the research was to determine overall and local values of the permeability in horizontal as well as in vertical direction and the anisotropy of the thin-layered sedimented ash. The coal ashes are hydraulic transported through pipelines in form of a slurry and periodical floated on the beach of the impoundment. The ashes are deposited in the form of a thin-layered sediment, with random alternation of layers with a coarser or finer granularity. The ash impoundment sediment is anthropogenic sediment with horizontally laminated texture. So the sediment is anisotropic from the viewpoint of water seepage. The knowledge of the permeability and the seepage anisotropy of the sediment is basic requirement for the design of an appropriate dewatering system. The seepage anisotrophy of the ash sediment has been checked by means of stochastic modelling, based on the correlation between the effective grain diameter and the coefficient of permeability of the ash : the effective grain diameter and the thickness of individual layers have been proposed to be random events.

ANALYSIS OF LOCAL ANOMALIES CAUSES IN THE UPLIFT DEVELOPMENT IN THE CIERNY VÁH SUBSOIL

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ABSTRACT

The pumped storage hydropower plant Cierny Váh was created by means of damming up the valley of the Cierny Váh River. The dam is 18.5 m high above terrain and 375 m long in the dam´s crest. Total capacity of the reservoir is 5.1 million m3. Complicated geological conditions in the subsoil of dam's body - fractured dolomite with local occurrence of tectonic breccia and clays, with the occurrence of intense disturbances - called for the construction of the grouting curtain in the dam´s subsoil. Its depth is about 20 in the area of the riverine plain, and about 60 m in the areas of abutments. During foregoing operations of the structure, more than 30 years, were recorded local anomalies in the uplift development in the right abutment´s subsoil of the lower reservoir dam. Their abnormally high values on the downstream side of grouting curtain have become the subject of extensive discussion and a stimulus for its remediation. To ensure reliable operation of the hydraulic structure was carried out a comprehensive analysis of the impact of the long-term operation of the reservoir on the dam safety. This included an examination of the causes of anomalous development of uplifts using FEM numerical modelling. The paper presents obtained results from this analysis.

GEOTECHNICAL MONITORING OF THE AUTOMOBILE ROAD

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ABSTRACT

In the present article, the results of geotechnical monitoring of A-147 automobile road "Dzhubga-Sochi" are given. Some sections of the automobile road suffered from the landslide adjustment movements; it resulted in many deformations of the retaining structures, the damages of the roadbed and ground crawling over the retaining walls. The observation data made it possible to specify the borders of the active landslide and to form a forecast of the landslide activity in the sections of the automobile roads. Due to monitoring being carried out, there was substantiated the necessity to correct the service forms and records connected with the automobile road reconstruction.

STABILITY OF COVER LAYERS ON SLOPES WITH GEOMEMBRANE SEALING

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ABSTRACT

The paper discusses the problem of stability assessing in case of cover layer formed on the embankment slopes with geomembrane sealing. In case of slopes of the newly built embankments, particularly in the construction of landfills, sediment ponds, flood embankments, there is a significant problem of ensuring the slope stability from the effects of surface erosion caused by heavy rain. Many different methods of surface protection are used, including geocells. Those surface protection, in combination with the geomembrane sealing, could create an unstable structure, which is a big challenging for designers and contractors.In recent years, innovative system solutions have emerged, combining geomembrane dealing with the geocells (cellular confinement systems). The article presents problems related to such solutions on the example of the Geoqiube system. Examples of uses and design problems that lead to landslides are shown. Discussion on design method and comments on the correctness of the solution are presented.

3D-FEM ANALYSIS ON GEOGRID REINFOCED FLEXIBLE PAVEMENT ROADS

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ABSTRACT

Nowadays, the need to increase pavement service life, guarantee high performance, reduce service and maintenance costs has been turned a greater attention on the use of reinforcements. This paper presents findings of a numerical investigation on geogrid reinforced flexible pavement roads, under wheel traffic loads, using a three-dimensional Finite Element Method (FEM). The results obtained show the effectiveness of glass fiber grids as reinforcement. Hence, with appropriate design and correct installation, by improving interface shear resistance, glass fiber grids can be used to expand the performance of flexible pavements providing a relevant contribution against superficial rutting.

FOUNDATION PILE QUALITY ASSESMENT IN VARIOUS SOILS

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ABSTRACT

One of the most important concerns and difficulties in geotechnical engineering is to evaluate the performance of foundations aiming to ensure safety and reliability in the construction work. As the foundation is an essential part in the functionality of a structure it is extremely important to carry out the control of its quality and capacity, in order to ensure a perfect transmission of the loads to the ground and to mitigate any problems that may appear during construction and execution of the work, avoiding damage over the lifetime of the structure. The selection of appropriate pile testing method is usually determined by technical conditions such as: piling technology, required load, time which can be devoted to testing. The testing procedure is also highly dependent on ground conditions around the pile that determine possible soil setup before testing and consolidation effects during testing. In this context, geotechnical technologies are applied to perform tests in the field, able to evaluate parameters and infer, for example, the integrity, the maximum capacity and the length of a pile. The presented study juxtaposes author's experiences from 3 months training period at Wroclaw University of Science and Technology in September-November 2014. This research project is related to the control and analysis of the quality and capacity of piles considering variables such as soil type, type of foundation, type of pile, purpose of the structure building, among others. Three tests performed in six locations of Poland are described, in order to evaluate the integrity and capacity of piles - Pile Integrity Test (PIT), Static Load Test (SLT) and Dynamic Load Test (DLT). Of the six case studies: three concern the study of integrity of Continuous Flight Auger piles (CFA) and three are related to the study of the capacity of Continuous Flight Auger (CFA), Jet Grouting and Controlled Modulus Columns (CMC). The main results are presented and interpreted aiming at sustainable and safe construction conditions.

THE APPLICATION OF CRUSHED CONCRETE IN GEOTECHNICAL ENGINEERING - SELECTED ISSUES

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ABSTRACT

The reuse of building materials becomes an important issue in sustainable engineering. As the technical requirements for civil engineering structures changes with time and the life time is limited, the need of building new objects meets the necessity of recycling of the existing ones. In the case of steel structures, the possibility of recycling is obvious, also in the case of wooden constructions, the possibility of "burning" solves the problem. Concrete poses a lot of problems mainly for two reasons. It is difficult to crush, heavy and hard to transport and demanding in reuse. Different fractions (particle sizes) may be used for different purposes. Starting from very fine particles which can be used in concrete production, through regular 16-300 mm fractions used to form new fills and fill the mats, up to very irregular mixtures used to form stone columns by means of Impulse Compaction or in Dynamic Replacement. The presented study juxtaposes authors experience with crushed concrete used in civil engineering, mainly in geotechnical projects. Authors' experiences comprises the application of crushed concrete in the new concrete production in Russia, changing pulverized bridge into the fill of mesh sacks, or mattresses used as an effective way to protect the shoreline and the New Orleans East land bridge after Katrina storm (forming a new shoreline better able to withstand wave actions), and finally the use of very irregular concrete fractions to form stone columns in week soils on the example of railway and road projects in Poland. Selected case studies are presented and summarized with regard to social, technical and economical issues including energy consumption needed for proposed technologies and dynamic impact of ground transmitted vibrations and noise.

FIELD TEST OF DRIVEN PILE GROUP UNDER LATERAL LOADING

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ABSTRACT

All the geotechnical works need to be tested because the diversity of soil parameters is much higher than in other fields of construction. Horizontal load tests are necessary to determine the lateral capacity of driven piles subject to lateral load. Various load tests were carried out altogether on the test field in Kutno (Poland). While selecting the piles for load tests, different load combinations were taken into account. The piles with diverse length were chosen, on the basis of the previous tests of their length and integrity. The subsoil around the piles consisted of mineral soils: clays and medium compacted sands with the density index ID>0.50. The pile heads were free. The points of support of the "base" to which the dial gauges (displacement sensors) were fastened were located at the distance of 0.7 m from the side surface of the pile loaded laterally. In order to assure the independence of measurement, additional control (verifying) geodetic survey of the displacement of the piles subject to the load tests was carried out (by means of the alignment method). The trial load was imposed in stages by means of a hydraulic jack. The oil pressure in the actuator was corrected by means of a manual pump in order to ensure the constant value of the load in the on-going process of the displacement of the pile under test. On the basis of the obtained results it is possible to verify the numerical simulations of the behavior of piles loaded by a lateral force.

INFLUENCE OF SURROUNDING SOIL CONDITIONS AND JOINT SEALING ON SEEPAGE RESISTANCE OF A SHEET PILE WALL. THREE DIMENSIONAL NUMERICAL ANALYSES.

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ABSTRACT

The aim of this article is to present the 3D numerical calculations results of the seepage resistance of sheet pile (SP) wall with sealed and unsealed (filled by soil) joints. Unlike to the approach presented in [Steel Sheet Piling. The Impervious Steel Sheet Pile Wall. Part 1: Design. Part 2: Practical Aspects, http://www.arcelormittal.com/palancole/uploads/files/AMCRPS_Impervious_EN.pdf] and [Widong, 2004] (concept of joint resistance) in present work the leakage through SP wall was determined for one joint of full length. In the analyzed example the SP wall passed through one kind of soil but some conditions (permeability of joint and of surrounding soil) changed depending on the adopted assumptions. To find the distribution of the total head in the calculation area Laplace equation was used. To determine the velocity field Darcy's law was adopted. The validity of Darcy's law in the task of this kind can be questionable, therefore for this issue some comments were made in the paper. In the first step the discharge flowing through the single joint of SP wall based on 3D numerical simulations was determined. In the next step the joint resistance was estimated and the discharge was found analytically. The results obtained using these two methods were compared. And the conclusions are as follows: it seems possible to estimate the "joint permeability" coefficient using numerical methods, in some conditions the analytical results are far away from numerical ones due to the nonlinear pressure distribution along the joint, it is necessary to collect in-situ data to confirm the usefulness and reliability of obtained solutions and to proposed more complete methods of determination of SP wall seepage resistance.

THE LABORATORY STUDY OF SHEAR STRENGTH OF THE OVERCONSOLIDATED AND QUASI-OVERCONSOLIDATED FINE-GRAINED SOIL

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ABSTRACT

The paper presents results of laboratory shear strength test conducted on fine-grained soil samples with different grain size distribution and with different geological age and stress history. The Triaxial Consolidation Undrained (TXCIU) and Direct Shear test were performed under different (confined) consolidation stress (under normal and overconsolidadion stress state) on the samples with both: natural and laboratory consolidated structure. Soil samples were selected from sediment series of different age and geological origins and geological past: mio - pliocene clay, pleistocene sandy clay (till) and pleistocene silt (loess). Paper pointed out that overconsolidated and quasi- consolidated soil in same stress and environmental condition could show almost similar behaviour, in other condition could behave significantly different. The correct evaluation of geotechnical parameters, the possibility of predicting their time-correctability is only possible with appropriately recognized geological past and past processes that accompanied the soil formation.

A PROPOSED METHOD FOR DETERMINATION OF DISPERSIVITY PERCENTAGE OF DISPERSIVE SOILS

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ABSTRACT

Dispersive soils are rich in sodium cations in their pore fluid and clay's double layer. These types of soils tend to disperse in the presence of water even without any hydraulic gradient. Due to the influence of sodium ions upon dispersivity behaviour of these types of soils, the soil-water ratio is an important factor in experimental performance. Therefore, the determination of dispersivity percentage of soil is affected by soil-water ration in experimental procedure. Based on the above mentioned points, there are some discrepancies in experimental results once the dispersivity percentage is determined by different types of dispersivity experiments. The main objective of this paper is to propose a method for determination of dispersivity percentage of soil to overcome some limitations of current methods in determination of realistic soil dispersivity percentage. To achieve the above mentioned objective, a series of batch equilibrium experiments was performed with different soil-water ratio on natural dispersive soil samples. The dispersivity percentages of these samples were determined and then were compared with the results of exchangeable sodium percentage of soil as a basic criterion for dispersivity determination. Based on the achieved results it is shown that the batch equilibrium experiment is very capable for sample preparation process in determination of dispersivity percentage of soil. The results show a very acceptable correlation among the cation determination and dispersivity percentage of soil in batch equilibrium test which is attributed to the privilege of the proposed method to take into account the soil-water ratio.

PROTECTION OF BURIED PIPE UNDER REPEATED LOADING BY GEOCELL REINFORCEMENT

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ABSTRACT

With increase in cities' population and development of urbane life, passing buried pipe lines near ground's surface is inevitable in urbane areas, roads, subways and highways. This paper presents the results of three-dimensional full scale model tests on high-density polyethylene (HDPE) pipe with diameter of 250 mm in geocell reinforced soil, subjected to repeated loading conditions to simulate the vehicle loads. The effect of geocell's pocket size (55*55 mm and 110*110 mm) and embedment depth of buried pipe (1.5 and 2 times pipe diameter) in improving the behavior of buried pipes was investigated. The geocell's height of 100 mm was used in all tests. The repeated load of 800 kPa was applied on circular loading area with diameter of 250 mm diameter. The results show that the behavior of the pipes has been influenced significantly upon the use of geocells in pipe displacement, soil surface settlement and transferred pressure on the pipe's crown. For example, the vertical diametral strain (VDS) and soil surface settlement (SSS), in a way that using a geocell with pocket size of 110*110 mm reduces by 27% and 43%, respectively, compared with the unreinforced one. Meanwhile, by increasing buried depth of pipe from 1.5D to 2D, the use of geocell of 110*110 mm delivers about 50% reduction in SSS and VDS, compared with the unreinforced soil.

THE INFLUENCE OF DILATION ON THE STRENGTH OF SAND -STEEL INTERFACES

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ABSTRACT

In this paper the sand-steel interface behaviour is analysed on the basis of frictional state theory. It is shown that for a small stress level the influence of dilatancy is fundamentally similar for sand-steel as sand-sand behaviour for a direct shear test. The use of the new parameter describes the influence of surface roughness on stress-dilatancy relationship. The peak strength of sand-steel is analysed. Values of the new parameter grow with normalised roughness for smooth surface and are constant for intermediate and rough surfaces. It is also shown that values of normalised friction coefficient obtained theoretically are similar with those shown in literature.

BEHAVIOUR OF MASONRY WALLS UNDER HORIZONTAL SHEAR IN MINING AREAS

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ABSTRACT

The paper discusses behaviour of masonry walls constructed with small-sized elements under the effects of mining activity. It presents some mechanisms of damage occurring in such structures, its forms in real life and the behaviour of large fragments of masonry walls subjected to specific loads in FEM computational models. It offers a constitutive material model which enables numerical analyses and monitoring of the behaviour of numerical models as regards elastic-plastic performance of the material, with consideration of its degradation. Results from the numerical analyses are discussed for isolated fragments of the wall subjected to horizontal shear, with consideration of degradation, impact of imposed vertical load as well as the effect of weakening of the wall, which was achieved by introducing openings in it, on the performance and deformation of the wall.

STRESS-DILATANCY OF CAMBRIA SAND FOR TIAXIAL TESTS AT HIGH PRESSURES

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ABSTRACT

In this paper the stress-dilatancy relationship of Cambria sand for drained triaxial compression and extension tests at high stress level is investigated. The stress dilatancy relationship is obtained by use of frictional state theory and experimental tests data published in literature. It is shown that stress-dilatancy relationship is bilinear, described by three parameters of frictional state theory: critical friction angle and two other parameters. It is accepted that critical friction angle is independent of confining pressure. The two additional parameters are strongly dependent on confining pressure. The two additional parameters are different for initial and advanced stages. The point at which the values of perimeters change is termed as Transformation Shear Point. This point is not simply visible either in stress ratio-strain or the volume change-strain relationship which are traditionally shown in soil mechanics publication. Transformation Shear Point is very characteristic in stress ratio-plastic dilatancy plane. Thus stress ratio- plastic dilatancy is very important for describing stress-strain behaviour of soils. The relationship shown in paper can be used in soil modelling in the future.

TRANSFER OF WATER IN THE SOIL-PLANT- ATMOSPHERE SYSTEM AT PLOT LEVEL IN THE HIGH CHELIFF PLAIN -ALGERIA

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ABSTRACT

The alluvial plain of Upper Cheliff plain called El-Khemis is situated at 120 km in the south west of Algiers. It has an area of 21,035 Km2. It is bounded to the north by the mountains of Zaccar, to the south by the foothills of the Ouarsenis, to the west by massive Doui and eastern Jebel Gountas. It has a relatively low slope (15%) (M Hattab., 1998). It is bordered to the north by cones droppings which constitute the transition zone between the valley and mountains. In the zone of High Chelif, the annual average rainfall varies from 250 to 470mm. Knowing that the lack of sufficient available water is a major obstacle for the development of the agricultural production, its economy and its good management require the comprehension of its distribution in the soil-plant-atmosphere system. In this context and to better optimize the management of the contribution of the water of the rainy season by improving its maximum use and reserve by the plants, it is necessary to make a study on the distribution of water in the soil-plant-atmosphere system. The goal of this work is to analyze the dynamics of water in the soil, the evolution of water stocks according to the contribution, consumption of the plants and the evaluation of losses. It is important to understand the morphology, water and physico-chemical characteristics of the soil profile where the storage is carried out, the amount that can be stored and be available to the plant, and that lost by drainage and evapotranspiration. This soil has adverse physical properties, a water reserve that can be significant but not very extractable by the roots (PF 4,2 quickly reached) and a compactness and significant variations of volume preventing the good development of the roots.

STUDY OF THE COMPONENTS OF THE SUPERFICIAL FLOW OF WADI EL HARRACH AT HAMMAM MELOUANE STATION (MITIDJA PLANE, ALGERIA)

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ABSTRACT

The work of assessing basal and flood flows is part of a work related to the availability of water to artificially recharge of the Mitidja groundwater in central Algeria. To do so, the hydrometric data of the station of the Rocher des Piégeons were used. This station is located at the upstream of the region of the recharge. According to the results, the total volume of water produced varies from 8.5 million m3 in autumn to 69.50 million m3 in winter. Basic flow varied from 48% to 91% of the total flow. The high value of the IEB in summer indicates that the flow in the wadi is perfectly supported by the hypodermic waters. On a chronological level, the IEB is obviously sensitive to climatic events and especially rainfall; It decreases at the time of floods and increases during periods of low flow. Its annual and monthly evolution over several studied years highlights the main trends of the climate. In conclusion, it can be said that the volumes of water of Hammam Melouane Wadi is largely sufficient in winter and summer to feed the Mitidja groundwater artificially.

HYDROGEOLOGICAL AND ENVIRONMENTAL STUDIES FOR THE AGRICULTURAL SUSTAINABLE IN WADI AL-FARIG AREA, WESTERN DESERT, EGYPT

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ABSTRACT

Wadi El-Farigh which is located south west of Wadi El-Natroun and surrounding areas represents one of new promising reclaimed areas in Egypt. The present groundwater supplies in Wadi El-Farigh and surrounding areas is generally limited to meet the expected increase in water demands, therefore, serious strategies plane for water management have to be established to fully utilize the ground water resources at economic coast. The present study deals with the study of the hydrogeological and Environmental impacts on groundwater resources using Remote Sensing and GIS techniques in the new reclaimed area for agriculture development in Wadi El-Farigh. This study aims to determine the prevailing the hydrogeological and Environmental condition which affected on the water bearing formations. These conditions are reflected by a gradual increase of ground water salinity and ground drawdown in water levels. The sustainability of a water resource requires a reconciliation of environmental, social and economic demands. These three pillars of sustainability are not mutually exclusive, but mutually reinforced. For many environmentalists the idea of sustainable development is an oxymoron as development seems to entail environmental degradation. A solution is proposed to implement a surface water conveyance system (pipeline to avoid losses due to evaporation and to avoid lifting surface water due to the topography, extracting water from the adjacent canals of the Nile Delta such as the Rayah Nasery to the Wadi El-Farigh and Wadi El-Natrun depression.

THE PARTICLE SIZE CHARACTERISTICS OF FLUVIAL SUSPENDED SEDIMENT IN PROGLACIAL STREAMS, KING GEORGE ISLAND, SOUTH SHETLAND ISLAND

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ABSTRACT

In this study, the characterization of particle size distribution of suspended sediment that is transported by streams (Ornithologist Creek, Ecology Glacier Creeks, Petrified Forest Creek, Czech Creek, Vanishing Creek, Italian Creek) in the area of the Arctowski Polish Antarctic Station is presented. During the first period of the summer season, the aforementioned streams are supplied by the melting snow fields, while later on, by thawing permafrost. The water samples were collected from the streams at monthly intervals during the Antarctic summer season (January - March) of 2016. The particle size distribution was measured in the laboratory with a LISST-25X laser diffraction particle size analyzer. According to Sequoia Scientific Inc., LISST-25X can measure particle sizes (Sauter Mean Diameter) between 2.50 and 500 µm. The results of particle size measurements were analyzed in relation to flow velocity (0.18-0.89 m/s), the cross-sectional parameters of the streams, suspended sediment concentration (0.06-167.22 mg/dm3) and the content of particulate organic matter (9.8-84.85%). Overall, the mean particle size ranged from 28.8 to 136 µm. The grain size of well-sorted sediments ranged from 0.076 to 0.57, with the skewness and kurtosis values varying from -0.1 to 0.4, and from 0.67 to 1.3, respectively. Based on the particle size characteristics of suspended sediment, the streams were divided into two groups. For most of the streams, the sediment was very well sorted, while fine sand and very fine sand were dominant fractions displaying symmetric and platykurtic distributions, respectively. Only in two streams, the suspended sediment consisted of silt-size grains, well or moderately well sorted, with coarse-skewness and mostly mesokurtic distribution. The C-M chart suggested that the transportation processes of suspended sediment included the suspended mode only. The grain-size distribution of suspended sediment was mainly influenced by the stream runoff, surface sediment type and biological processes.

The collected data used in the paper were based on Henryk Arctowski Polish Antarctic Station monitoring programme.

SPATIAL AND TEMPORAL MODELING OF RUNOFF FOR SURFACE AND UNDERGROUND SEWER INFRASTRUCTURES

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ABSTRACT

Runoff caused by rainfall can induce various types of damage depending on precipitation, topography, hydrologic, and on-site conditions. In order to prevent such damage, drainage facilities such as ditch and underground waterway tunnels are installed in sites as urban area, open-pit mine, tailing dam, etc. Geographic Information System(GIS) is one of the effective tools to interpret the complex behavior of runoff occurs during the water treatment process of these facilities. Algorithms and methodologies for runoff modeling using GIS have been developed and modeling for considering both the natural topography and the behavior of drainage facilities has been suggested. However, existing studies have not been able to model the temporal capacity of the facilities and the phenomena that the site is flooded, recovered and inundated temporarily in concentrated rainfall. This study presents a new technique for the spatial and temporal modeling of surface runoff using a digital elevation model (DEM) by considering surface and underground stormwater infrastructure. This modeling uses the diffusion wave equation to calculate temporal changes in variables involved in surface runoff, such as flow depth and velocity. This technique can simulate the propagation of flood waves around stormwater infrastructure by calculating the volume of water flowing into inlets within the infrastructure and the time taken for this water to be removed from the infrastructure via outfalls. A time-specific flow depth and accumulative flux for each cell on the DEM and for inlets and outfalls of the stormwater infrastructure was calculated. This paper describes the concept behind, and details of, the new technique, and outlines potential applications for this technique using synthetic and real-world datasets. The validation data indicate that the new technique is an effective approach for the spatial and temporal modeling of surface runoff using a DEM that can incorporate the effects of stormwater infrastructure.

HYDROGEOLOGICAL, HYDROGEOCHEMICAL AND ISOTOPE GEOCHEMICAL FEATURES OF THE GEOTHERMAL WATERS IN SEFERIHISAR, WESTERN ANATOLIA, TURKEY

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ABSTRACT

The study area of Seferihisar (Izmir) is located within the Izmir-Ankara suture in the NW of the Menderes Massif in western Anatolia, Turkey. The Paleozoic metamorphic rocks of the Menderes Massif form the basement rocks in the area which are overlain by 760 m Izmir-flysch series consisting of metamorphic rocks, limestones and ultrabasic rocks tectonically. The Pliocene Bahçecik formation which consists of an alternation of conglomerates, sandstones, claystones, lignites and limestones and shows a thickness of 300 m overlie the Izmir-flysch series discordantly. This is overlain by 430 m thick Yeniköy formation composed of conglomerates, sandstones, claystones and clayey limestones discordantly. The Miocene Comaovasi volcanic rocks overlie the Yeniköy formation concordantly which are overlain by alluvium and travertine deposits. Geothermal waters which are observed in the localities of Tuzla, Cumali, Doganbey and Karakoç are associated with NE-SW trending faults in the area. The samples of geothermal waters were collected from five different locations. In these samples, cations, anions, stable isotopes and tritium were analysed. Generally, the geothermal waters in the investigation area are classified as Na-Cl or Na-Cl-HCO3 type waters. The geothermal waters of Seferihisar and environs are identified to be Na+K>Ca>Mg dominant cations and Cl>HCO3>SO4 dominant anions. According to the diagram of Na/100-K/100-?Mg, a certainly part of the thermal waters can be considered as equilibrated thermal waters during some waters are of mature waters. According to the results of geochemical thermometers, the reservoir temperatures of thermal waters range from 150 to 240°C. the d2H values of thermal waters are between -13,3 to -31,9, while d18O values range from -2,55 to -5,70. The tritium contents of thermal waters are between 13 to 64±10 TU.

HYBRID STOCHASTIC FORECASTING MODEL FOR MANAGEMNT OF LARGE OPEN WATER RESERVOIR WITH STORAGE FUNCTION

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ABSTRACT

The main advantage of stochastic forecasting is fan of possible value, which deterministic method of forecasting could not give us. Future development of random process is described better by stochastic then deterministic forecasting. Discharge in measurement profile could be categorized as random process. Content of article is construction and application of forecasting model for managed large open water reservoir with supply function. Model is based on neural networks (NS) and zone models, which forecasting values of average monthly flow from inputs values of average monthly flow, learned neural network and random numbers. Part of data was sorted to one moving zone. The zone is created around last measurement average monthly flow. Matrix of correlation was assembled only from data belonging to zone. The model was compiled for forecast of 1 to 12 month with using backward month flows (NS inputs) from 2 to 11 months for model construction. Data was got ridded of asymmetry with help of Box-Cox rule (Box, Cox, 1964), value r was found by optimization. In next step were data transform to standard normal distribution. The data were with monthly step and forecast is not recurring. 90 years long real flow series was used for compile of the model. First 75 years were used for calibration of model (matrix input-output relationship), last 15 years were used only for validation. Outputs of model were compared with real flow series. For comparison between real flow series (100% successfully of forecast) and forecasts, was used application to management of artificially made reservoir. Course of water reservoir management using Genetic algorithm (GE) + real flow series was compared with Fuzzy model (Fuzzy) + forecast made by Moving zone model. During evaluation process was founding the best size of zone. Results show that the highest number of input did not give the best results and ideal size of zone is in interval from 15 to 25, when course of management was almost same for all numbers from interval. Resulted course of management was compared with course, which was obtained from using GE + real flow series. Comparing results showed that fuzzy model with forecasted values has been able to manage main malfunction and artificially disorders made by model were founded essential, after values of water volume during management were evaluated. Forecasting model in combination with fuzzy model provide very good results in management of water reservoir with storage function and can be recommended for this purpose.

WATER AND SEDIMENT EVALUATION USING CELLULAR AUTOMATA ON ALPINE CATCHMENT: SOANA (ITALY) TEST CASE

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ABSTRACT

In the alpine contest, the estimation of the rainfall (inflow) and the discharge (outflow) data are very important in order to, at least, analyse historical time series at catchment scale; determine the hydrological maximum and minimum estimate flood and drought frequency. Hydrological researches become a precious source of information for various human activities: power energy production in alpine environment, agricultural and livestock farming, water availability in plain areas, manufacturing production, waterworks or land use management and planning. Many rainfall-runoff models have been proposed to reflect steady, gradually-varied flow condition inside a catchment. In these last years the application of 'Reduced Complexity Models (RCM)' has been representing an excellent alternative resource for evaluating the hydrological response of catchments, within a period of time up to decades. Hence, this paper is aimed at the discussion of the application of the research code CAESAR, based on cellular automaton (CA) approach, in order to evaluate the water and the sediment outputs from an alpine catchment (Soana, Italy), selected as test case. The comparison between the predicted numerical results, acquired by parametric analysis, and the available measured data are discussed. Finally, the analysis of the computed sediment budget over ten years is presented. The necessity of a fast, but reliable numerical support when the measured data are not so easily accessible, as in Alpine catchments, is highlighted.

AN EVALUATION OF SURFACE RUNOFF GENERATION PROCESSES USING A RAINFALL SIMULATOR: A SMALL SCALE LABORATORY EXPERIMENT

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ABSTRACT

Nowadays, rainfall simulators are being used by many researchers in field or laboratory experiments. The main objective of most of these experiments is to better understand the underlying runoff generation processes, and to use the results in the process of calibration and validation of hydrological models. Many research groups have assembled their own rainfall simulators, which comply with their understanding of rainfall processes, and the requirements of their experiments. Most often, the existing rainfall simulators differ mainly in the size of the irrigated area, and the way they generate rain drops. They can be characterized by the accuracy, with which they produce a rainfall of a given intensity, the size of the irrigated area, and the rain drop generating mechanism. Rainfall simulation experiments can provide valuable information about the genesis of surface runoff, infiltration of water into soil and rainfall erodibility. Apart from the impact of physical properties of soil, its moisture and compaction on the generation of surface runoff and the amount of eroded particles, some studies also investigate the impact of vegetation cover of the whole area of interest. In this study, the rainfall simulator was used to simulate the impact of the slope gradient of the irrigated area on the amount of generated runoff and sediment yield. In order to eliminate the impact of external factors and to improve the reproducibility of the initial conditions, the experiments were conducted in laboratory conditions. The laboratory experiments were carried out using a commercial rainfall simulator, which was connected to an external peristaltic pump. The pump maintained a constant and adjustable inflow of water, which enabled to overcome the maximum volume of simulated precipitation of 2,3 l, given by the construction of the rainfall simulator, while maintaining constant characteristics of the simulated precipitation. In this study a 12-minute rainfall with a constant intensity of 5 mm/min was used to irrigate a corrupted soil sample. The experiment was undertaken for several different slopes, under the condition of no vegetation cover. The results of the rainfall simulation experiment complied with the expectations of a strong relationship between the slope gradient, and the amount of surface runoff generated. The experiments with higher slope gradients were characterised by larger volumes of surface runoff generated, and by shorter times after which it occurred. The experiments with rainfall simulators in both laboratory and field conditions play an important role in better understanding of runoff generation processes. The results of such small scale experiments could be used to estimate some of the parameters of complex hydrological models, which are used to model rainfall-runoff and erosion processes at catchment scale.

HYDROGEOLOGICAL MODELING OF SOME GEOTHERMAL WATERS IN IVRINDI, HAVRAN AND GÖNEN IN THE PROVINCE CAPITAL OF BALIKESIR, TURKEY

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ABSTRACT

In this study, hydrogeological, hydrogeochemical and isotope geochemical features of the geothermal systems of Ivrindi, Havran and Gönen in the province capital of Balikesir were investigated . The geothermal waters in the area are distinguished by surface temperatures between 28,8 and 39,3 °C in Ivrindi, 25 and 57 °C in Havran and 34 and 76 °C in Gönen. In the geothermal field of Ivrindi, the Permian olistolithes form the basement rocks in Early Triassic age which are overlain by an alternation of conglomerates, metagraywackes and siltsones. The both rock series are overlain by Neogene volcanics and lacustrine sediments and Quaternary alluvium. In Havran, the Early Triassic Karakaya formation is the oldest rocks series consisting of mostly ultrabasic rocks which are cut by Oligocene to Miocene granodiorites. In the area, there are Upper Oligocne to Early Miocene dacitic pyroclastic rocks overlain by Middle to Upper Miocene lacustrine sediments. The geothermal waters are associated with NE-SW trending, right lateral and NW-SE trending left lateral strike-slip faults. In the area of Gönen, the Early Triassic basalts, diabases, gabbros, radiolarites and mudstones form the basement rocks which are overlain by the Upper Triassic to Early Cretaceous sandy limestones. Early to Middle Miocene andesitic lava flows overlie the last rock sequence. The andesitic lava flows are overlain by an alternation of conglomerates, sandstones and claystone underline by rhyolithic pyroclastic materials and Quaternary alluvium. Hydrogeochemically, the geothermal waters of the study areas are considered as Na-HCO3 type waters with an exception of samples from Ivrindi. Moreover, the geothermal waters of the areas of an immature origin. Finally, the geothermal waters have reservoir temperature between 120 t0 160 °c. From these points of reviews, the geothermal waters were modelled hydrogeochemically.

HYDROGEOLOGICAL MODELING OF THE GEOTHERMAL WATERS OF ALASEHIR IN THE CONTINENTAL RIFT ZONE OF THE GEDIZ WITHIN THE MENDERES MASSIF, WESTERN ANATOLIA, TURKEY

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ABSTRACT

In western Anatolia, Turkey, the continental rift zones of the Büyük Menderes, Küçük Menderes and Gediz were formed by extensional tectonic features striking E-W generally and representing a great number of active geothermal systems, epithermal mineralizations and volcanic rocks from Middle Miocene to recent. The geothermal waters are associated with the faults which strike preferentially NW-SE and NE-SW and locate diagonal to general strike of the rift zones of the Menderes Massif. These NW-SE and NE-SW striking faults were probably generated by compressional tectonic regimes which leads to the deformation of uplift between two extensional rift zones in the Menderes Massif. The one of these rift zones is Gediz which is distinguished by a great number of geothermal waters such as Alasehir, Kursunlu, Çamurlu, Pamukkale and Urganli. The geothermal waters of Alasehir form the biggest potential in the rift zone of Gediz with a capacity of about 100 to 200 MWe. Geologically, the gneisses from the basement rocks in the study area which are overlain by an Paleozoic to Mesozoic intercalation of mica schists, quartzites and marbles, an Miocene intercalation of conglomerates, sandstones and clay stones and Plio-Quaternary intercalation of conglomerates, sandstones and clay stones discordantly. In the study area, Paleozoic to Mesozoic quartzites and marbles form the reservoir rocks hydrogeologically. The geothermal waters anions with Na+K>Ca>Mg dominant cations and HCO3>Cl> dominant anions are of Na-HCO3 type and can be considered as partial equilibrated waters. According to the results of geochemical thermometers, the reservoir temperatures area of about 185 °C in accordance with measured reservoir temperatures. Stabile isotopes of ?18O versus ?2H of geothermal waters of Alasehir deviate from the meteoric water line showing a intensive water-rock interaction under high temperature conditions. These data are well correlated with the results of the hydrogeochemical analyses which also indicate intensive water-rock interaction and reactions with silicates. In the study area, the geothermal waters of meteoric origin. The infiltration takes place along the Menderes Massif. Due to the deep circulation which is made possible by the deep reaching fault system of the rift zone of Gediz, the meteoric waters are heated by recent subvolcanic activity such as Kula volcano with human foot prints. In the area of Alasehir, the meteoric waters percolate at fault zones and permeable clastic sediments into the reaction zone of the roof area of a magma chamber (of Kula volcano) situated at a probable depth of 2-4 km where meteoric waters are heated by the cooling magmatic melt and ascend to the surface due to their lower density caused by convection cells. The volatile components of CO2, SO2, HCl, H2S, HB, HF and He out of magma reach the geothermal water reservoir where an equilibrium between altered rocks, gas components and geothermal waters performs. Thus, the geothermal waters ascend in tectonic zones of weakness at the rift zone of the Gediz in terms of hot springs, gases and steams. Finally, the geothermal waters of Alasehir are distinguished by a 2,0 percent CO2 of productions in geothermal power plants especially.

STATISTICAL INVESTIGATION OF HEAVY METAL POLLUTION: BETWEEN KEPEZ HPP AND BOGACAY (ANTALYA-TURKEY)

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ABSTRACT

Antalya, which is at the forefront of Turkey's major tourism centers and is called the Turkish Riviera, is quite rich in terms of water resources. The city's water needs is provided from underground waters. However, Antalya is located on tufa which has a karstic structure. Because of that, water moves frequently from the underground to the surface or from the surface to the underground. On the other hand, the population growth is remarkable in the 5th largest city of the country. Parallel to this, settlement areas are also expanding. The western part of the city is the best example of fast construction. The most important surface water in this region is the Bogacay river. The construction and also population growth continues on both sides of the river. The water which is coming out from the Kepez Hydroelectric Power Plant reaches via two channels to Mediterranean; one of them is Duden Falls in Lara, the other one is Bogacay in Konyaalti. However, it passes Goksu river before Bogacay. Heavy metal pollution in the surface water was investigated between Kepez Hydroelectric Power Plant and Bogacay in Konyaalti, in this study. For this study, 18 water samples were taken systematically; chemical analyzes were made; the Heavy Metal Pollution Index (HPI) was calculated and this index was used for classification. The critical pollution index value for drinking water is 100. As a result, only the HPI value calculated in water sample 13 has exceeded the predicted critical value. The HPI value obtained from other water samples does not reach the predicted critical value. It is necessary to determine the main source of the pollution and its origin at this point. However, a sustainable basin management plan should be made considering ecological, urban, agricultural and industrial water requirements. Therefore, water resources need to be protected against buildup and pollution.

ASSESSMENT OF THE GEOTHERMAL POTENTIALITIES OF MINE WATER: CASE OF THE COAL MINING AREA OF SAINT-ÉTIENNE

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ABSTRACT

When mining operations ends, the water table takes back its initial level by refilling the coal mine gradually, ending by the creation of an important reservoir with high spatial heterogeneities. This reservoir can be considered as a non-negligible low-temperature geothermal resource and usable for the district heating, passive houses and or the air conditioning. The groundwater contained in the mining area of Saint-Étienne has an average temperature of 14°C. It is superior by 2°C to the annual average temperature of the groundwater in France. The main objective of this work consists in estimating the geothermal potential of the mining area of Saint-Étienne. It is about combining hydrogeological analysis with numerical simulation of the exchanges in the heterogeneous underground environments. For that purpose, we study the hydric and thermal functioning of the mining area which is characterized by strong spatial heterogeneities, including porous media and drains with high hydraulic conductivity (flooded mining structures). The result of this combination should succeed on a 3D numerical model representing the mining area of Saint-Étienne and its various exploited coal layers, the groundwater flow as well as the spatial location of the geothermal potential of the mine water. The assessment of the geothermal potential integrates the spatiotemporal variability of the following criteria: Temperature, flow rates, conductivity and geothermal gradient.

AN EXAMPLE OF QANATS FOR THE SUSTAINABILITY OF GROUNDWATER USAGE, ANTALYA/TURKEY

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ABSTRACT

The protection of existing resources has become much more important than getting fresh water during the necessity for it has been increasing. Because of the fact that, some traditional methods, like well and pump, can cause to reduce the groundwater level and to dry up the reservoirs. On the other hand, there are some environmentally friendly methods like "qanat". Qanat is a water management system which has been used to supply water in semi-arid and arid regions for a long time; for example in Iran, Iraq, Morocco, Oman etc. The system consists of many vertical well connected by gently sloping tunnel with tapping into the groundwater table. The main idea is to reduce the evaporation and leakage, keep the natural balance of the groundwater without pumping. The main idea in this study is to find suitable places for qanats in terms of geology and hydrology and to create a model for new water projects in Antalya. A "pilot area" near to Elmali, which is one of district of Antalya, is selected. The geological units in the area are permeable - highly permeable mikritic limestone and impermeable - poor permeable claystone - siltstone, tectonically. The surface waters in the area are generally seasonal. The physical and chemical properties of surface waters were determined. The water in the area was classified "as very good quality water for drinking" and "very good for irrigations". Besides that, the geological model is very appropriate for "qanat" and to get water by gravitation without decreasing the groundwater table and damaging natural balance.

DISPLACEMENT OF WATERSHED BETWEEN TWO KARSTIC RIVERS

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ABSTRACT

The location and quantification of exchanges between rivers and phreatic table seems to be essential for the sustainable management of rivers and groundwater. Concerning the exchanges between rivers and alluvial groundwater, many multidisciplinary studies have been achieved [Lalot, 2014]; [Graillot et al., 2014]; [Marmonier, 2000]; [Négrel et al., 2003]; [Fette et al., 2005]; [Paran et al., 2015]. However, concerning the rivers in the karstic hydrosystem, the exchanges characterizations are more difficult to study and require an adaptation of the methods applied in porous aquifers. This is the objective of this work for which a multidisciplinary research study started in 2013 in the karstic area near Méjannes-le-Clap village (Gard, France) [Ré-Bahuaud et al., 2014]; [Ré-Bahuaud et al., 2015]; [Chapuis et al., 2014]. The karstic areas represent almost 50% of the French territory [Renaud, 1992], therefore there is an important interest from the point of view of groundwater resources in France. These resources have dual benefits, whether natural or anthropogenic, because they allow the stream supply of water during low-water periods and they are also important tanks of fresh-water. There is a lack of information concerning the Cèze karst canyon. Despite the fact that tracings have been made on the study area, the watershed boundary in the left bank of the Cèze River, between Cèze and Ardèche Rivers, is not defined. The objective is to highlight groundwater flowing circulations such as the previous artificial tracing, but focusing on the left bank of the Cèze which lacks of tracing. The study area includes the Cèze and Ardèche karstic canyons. This place is located in the south-east of France, between the Gard and Ardèche French departments. The karstic surface area is constituted of Early Cretaceous carbonate formations with Urgonian facies. Given its geographic location, its geology, and the large number of springs, this study area incorporates a large variety of hydrogeological configurations which are interesting to study the karst/river exchanges. Concerning the meteorological influence, the Cèze basin is influenced by a Mediterranean climate characterized by a strong low-water period in the summer and a heavy rainfall provoking flash floods in the fall. The tracing areas are choosing in function of their location, between Ardèche and Cèze Rivers, and their accessibility, into the aquifer karstic preferentially into the urgonian calcareous. Four artificial tracings are made in the study area, two caves and two areas of infiltration of river water. The artificial tracings made in river show that the infiltrate-water of the Cèze and a tributary supplies the left-bank springs of the Cèze River. The artificial tracings made in the caves between Ardèche and Cèze Rivers show that the groundwater flows are not unidirectional and seem to be a function of the hydric state of the karst. The directions of groundwater flow compare to the karstic cave shape suggest an extension of the Ardèche hydrogeological basin in detriment of Cèze hydrogeological basin. This result predicts a probable future extinction of Cèze River which will supply right-bank springs of the Ardèche River.

MONITORING AND ASSESSMENT OF WATER RETENTION MEASURES IN AGRICULTURAL LAND

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ABSTRACT

One of the most interesting events, from the environmental impact point of view, is the huge storm rainfall at which soil degradation processes occur. In Slovakia, agricultural areas with a higher slope have been recently increasingly denudated by water erosion processes. Areas having regular problems with muddy floods and denudation of soil particles have been currently identified. This phenomenon has long-term adverse consequences in the agricultural landscape, especially the decline in soil fertility, the influence on soil type and the reduction of depth of the soil profile. In the case of storm rainfall or long-term precipitation, soil particles are being transported and deposited at the foot of the slope, but in many cases the large amounts of sediment are transported by water in the form of muddy floods, while putting at risk settlements and industrial zones, along with contamination and clogging of watercourses and water reservoirs. These unfavourable phenomena may be prevented by appropriate management and application of technical measures, such as water retention ditches, erosion-control weirs, terraces and others. The study deals with determination of the soil loss and denudation of soil particles caused by water erosion, as well as with determination of the volume of the surface runoff created by the regional torrential rains in the area of the village of Sobotiste. The research is based on the analysis of flood and erosion-control measures implemented in this area. Monitoring of these water retention ditches for protection against muddy floods has been carried out since 2015 using UAV technology and terrestrial laser scanning. Monitoring is aimed on determination of the volume of the ditch, changes in its capacity and shape in each year. The study evaluates both the effectiveness of these measures to reduce the surface runoff as well as the amount of eroded soil particles depending on climatological conditions. The results of the research point to the good efficiency of these measures; however, in conjunction with belt crops cultivation they could form a comprehensive flood and erosion-control protection to eliminate the muddy floods and protect the settlements from surrounding slopes.

RESERVOIR CONSIDERATIONS AND DIRECT USES OF SÃO PEDRO DO SUL HYDROTHERMAL AND GEOTHERMAL FIELD, NORTHERN PORTUGAL

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ABSTRACT

São Pedro do Sul Hydrothermal and Geothermal Field, located in the northern interior zone of Portugal (Lafões zone), has the greatest widespread utilization of geothermal energy in Portugal mainland and is the most important thermal centre from the economical revenues point of view, obtained from direct and indirect utilization of the thermal water, mostly for wellness, health, and leisure of human beings. Recent utilization includes district and greenhouses heating and even cosmetic applications. The Hydrothermal Field includes two main exploitable zones: the Termas and the Vau. The waters are recognised for their mineral and medicinal effects, since the time of the Romans about 2000 years ago and, later on, on the 12th century, by the first King of Portugal, D. Afonso Henriques. The classical spring along with the 500 m well (AC1), located in the Termas zone, currently supplies artesian hot water flow of about 17 l/s with a temperature of 67ºC. Despite the low flow rate of the actual two exploration wells drilled in the Vau zone, the geothermal potential is high; a new deep well of 1200 m is planned to be drilled in this zone in order to obtain fluid temperature of around 75ºC. The occurrence of São Pedro do Sul thermal water, included in the sulphurous type waters, are linked to hercynian granitoids, emplaced between 290 and 321 Myr. There is a close relationship between the placement of the main hot springs and the Verin-Chaves-Penacova fault, namely Verin (Spain), Chaves, Moledo, and S. Pedro do Sul (Portugal) hot springs. Heat flow generated at shallow crustal zones by the radiogenic host mineral of the granitic rocks, added to the deep Earth heat flow, heats the cold water inflow along fractures. Open fracture network along the main faults allows the hot fluids reach the surface, thus giving chance to the occurrence of hot springs and mineralized cold springs. Coupling between fracture opening and density difference between cold water inflow and hot water upflow is assumed to be the main driven factors that explain the occurrence of hot spring in regions with normal to slightly abnormal geothermal gradient. Actual thermal output of the captured fluid in the São Pedro do Sul Hydrothermal area is not fully used, namely in summer times. Thus the main focus for the concessionary includes the saturation of the actual Termas heat power capacity either in the SPA utilization and expansion for newer users in the district heating system. Further studies must be conducted in order to ascertain for possible source deep exploitation to refine quantitatively the São Pedro do Sul reservoir conceptual model in order to make sustainable wise management of this important natural resource, critical for the São Pedro do Sul municipality development and also contributing for the Portuguese sustainable economic growth. In this paper we give new insights for the knowledge of São Pedro do Sul Hydrothermal and Geothermal Field, namely the geothermal reservoir, the concession hot water exploitation and future perspectives for upcoming developments of this valuable natural resource.

EXPERIENCE GAINED ON DIRECT USE OF LOW ENTHALPY ENERGY IN HOTEL DO PARQUE, S. PEDRO DO SUL, PORTUGAL

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ABSTRACT

Despite the high number of thermal flowing springs in Portugal mainland (up to 52 hot springs), ranging temperatures from 20ºC to 77ºC, and with significant water flow rate, few district heating system were implemented in Portugal. Here we present the São Pedro do Sul district heating system, located northern of Portugal. The thermal power plant were designed, completed and commissioned in 2001 allowing the utilization of the geothermal heat by local users, as Hotel do Parque. The district heating system sums about 15 years of utilization without interruption and with minor drawbacks. On this paper we present the project overview along with thermal power plant specifications and data numbers. Heat comes from a 17 L/s of thermal water supplied by a natural spring and a nearby shallow well. Heat from the spring and well sources is transferred to a secondary low mineralized water system by a plate heat exchanger, allowing the heating of ambient air and sanitary waters of hotel zones. Based on a theoretically cascade direct use of heat from a 67ºC to a 20ºC water temperature range, available heat totals 29132039 kWh yearly. However, past and actual use of heat only reaches around 30% of that figure. By comparing with fossil heat sources, actual use of a natural heat source reduces a theoretically amount of 116700 kg of CO2 emissions by year. The successful use of this district heating system can promote local expansion of new users and other possible heat uses of this renewable energy, giving chance for the power plant saturation.

GIS-BASED MODELLING OF SOIL LOSS AND SEDIMENT YIELD FOR JEQUETEPEQUE BASIN AND ASSESSMENT OF SEDIMENTATION IMPACTS ON GALLITO CIEGO DAM

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ABSTRACT

This research proposes the application of free access grid information, the application of the RUSLE model and the calculation of a coefficient of sediment production at subbasin level to estimate the dead volume in reservoirs located on the western margin of the Pacific slope, Being validated with information of the dead volume in the reservoirs of Gallito Ciego (Jequetepeque river basin) and Poechos (Chira river basin) and allowing the extrapolation of the sediment production and, therefore, the dead volume in the existing reservoirs or projected reservoirs . PISCO gridded data (Peruvian Interpolation of the CLIMATs and Hydrological Stations) of rainfall is used, with a historical series from 1981 to 2016 with a spatial resolution of 5 km on a monthly scale to determine the R factor; The SoilGrids SoilGrids Soil Texture Grid product developed by ISRIC (International Soil Reference and Information Center) with a spatial resolution of 250 m to determine the K factor; The topography from the SRTM (Shuttle Radar Topographic Mission Data) of 90 m resolution for the LS factor; The surface coverage, the GlobalLandCover product with a resolution of 30 m, for factor C and neglecting the value of factor P, due to the lack of erosion prevention activity in the basin at the regional level. The watershed of the Jequetepeque River has been chosen as a representative basin due to the characteristics similar to most of the basins of the Pacific slope, which shelters 65% of the population and suffers from a problem of water scarcity, besides having bathymetric information Of the Gallito Ciego reservoir in several years, is a source of validation with real data. The Gallito Ciego reservoir with a capacity of 544 MMC at the beginning of operations in 1988, has been reduced to 427 MMC by 2015; Resulting in a loss of useful volume of 117 MMC in 27 years. Of which, 35 MMC reduction was produced at the El Niño event. Considering the proposed methodology, the loss of useful volume due to sediment has been obtained that, since its start of operations, are 127 years of useful life, and considering events El Niño phenomenon is accentuated in 10 years extra volume for each event.

NUMERICAL STUDY OF MORPHODYNAMICS IN UCAYALI RIVER AND PUCALLPA PORT IMPLICATIONS

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ABSTRACT

This research aims to evaluate the hydraulic properties and processes of erosion and sedimentation using a 2D hydrodynamic-sediment transport modes to study the Ucayali River in the Peruvian Amazon, in a meandering zone close to Pucallpa port. We have used remote sensing techniques to assess plain morphodynamics and geomorphology implications, recognizing features that affects flow leading to a tendency to riverbank erosion and sedimentation processes. However with this time analysis and modeling, some changes will be denoted in the bed and we will be are able to note concentration of velocity patterns that could be a cause of future affections for Pucallpa port. During this work are denoted changes in the bed and the concentration of erosive velocities and shear stresses that affects a short and its effect on the bed and suspended load transport extending us a couple of kilometers upstream and downstream from the port to see potential impacts. To assess these processes, we applied CCHE2D model based on equilibrium bed load transport making use of its the state of the art sediment transport and bed evolution module in order to study non-uniform cohesive sediments. The models was calibrated using daily measurement campaigns for water levels and discharges carried out in the studied site as well as ADCP measurements. Size distribution of sediments was obtained by laboratory tests of field cohesive and non-cohesive samples getting settling velocities to set the model parameters. Parameters were studied by the evaluation of model parameters sensibility in this study case, recognizing their capabilities and difficulties modelling this domain of a river meander. Once we had obtained qualitatively consistent results, it is necessary to propose infrastructure solutions or port operation measures and planning to set a fluvial equilibrium and get the best hydrodynamic and navigation conditions in Pucallpa port.

ASSESSMENT OF THE GEOTHERMAL POTENTIALITIES OF MINE WATER: CASE OF THE COAL MINING AREA OF SAINT-ÉTIENNE

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ABSTRACT

When mining operations ends, the water table takes back its initial level by refilling the coal mine gradually, ending by the creation of an important reservoir with high spatial heterogeneities. This reservoir can be considered as a non-negligible low-temperature geothermal resource and usable for the district heating, passive houses and or the air conditioning. The groundwater contained in the mining area of Saint-Étienne has an average temperature of 14°C. It is superior by 2°C to the annual average temperature of the groundwater in France. The main objective of this work consists in estimating the geothermal potential of the mining area of Saint-Étienne. It is about combining hydrogeological analysis with numerical simulation of the exchanges in the heterogeneous underground environments. For that purpose, we study the hydric and thermal functioning of the mining area which is characterized by strong spatial heterogeneities, including porous media and drains with high hydraulic conductivity (flooded mining structures). The result of this combination should succeed on a 3D numerical model representing the mining area of Saint-Étienne and its various exploited coal layers, the groundwater flow as well as the spatial location of the geothermal potential of the mine water. The assessment of the geothermal potential integrates the spatiotemporal variability of the following criteria: Temperature, flow rates, conductivity and geothermal gradient.

AN INVESTIGATION ON ANCIENT BRIDGES LOCATED IN DIYARBAKIR PROVINCE

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ABSTRACT

Just as all historic structures, the ancient bridges reflect the cultures, religions, language, and civilization and development levels of people lived in the past, therefore they can be accepted as evidences of the lifestyle of the people built them. More than other historic structures, the ancient bridges give information about the early age hydrological, meteorological, geological characteristics of the region. This assesses the importance of the ancient bridges. Previously the ancient bridges made of basalt and those that made of limestone in Diyarbakir Province were studied separately by the same authors. According to the authors' investigation, no published studies, which include all of them together, were found in the current literature. In this study, therefore, all the historic bridges located in Diyarbakir province have been architecturally, hydrological, and geologically discussed and their specifications have been briefly presented. The number of detected ancient bridges built in Diyarbakir province is 42. Sixteen of them were made of basalt. These are Kızılçay, Devegeçidi, Halilviran, Karaköprü (on the Eğil road), Sancak, Şeytandere, Yiğityolu, Dilaver, Se-pıra 1-2-3, Taş helva 1- 2- 3, İskele, Karaköprü (on Mardin highway). The construction material of Çüngüş, Sinek-2, Çermik Hamam, Hoşan, Kalemdan, Karadere, Maden, Feyter, Gabon, Koki, Serdi, Ambar, Antak, Goderni, Hüseyin Ağa, Değirmen, Kemhuk, Onbaşılar, and Perpıra bridges are limestone. The remains were built with composite materials. These are Haburman (limestone + brick), Nişnik (probably limestone + basalt), Sinek-1 (basalt + limestone + brick), Pıra İbrahim (limestone + basalt), Dicle (basalt + brick), Koperi (limestone + brick), and Malabadi (limestone + brick). On the other hand, Çüngüş, Karaköprü (on the Eğil road), Sancak, Dilaver, Dicle, Koperi, and Malabadi have been restored. The number of bridges, which their restorations works are still go on, are Şeytandere, Se-Pıra 1-2-3, Taş Helva 1-2-3, and Iskele bridges. Goderni, Hüseyin Ağa, Kalemdan, and Hamam bridges will be restored in the nearest future time. Only Haburman, KaraKöprü (on Mardin highway), and Devegeçidi were simply repaired. The other bridges, which two of them (Perpira and Ambar bridges) have only remnants, are still needs restoration. The central span of the Malabadi Bridge is the largest in Anatolia.

THE UNDERFLOW CHANNELS SUGGESTED BY THE 4TH GRADE STIDENTS OF KAWATANAKA PRIMARY SCHOOL, TOKUSHIMA PREFECTURE, JAPAN, STUDIED THE PREVENTION DISASTER PROGRAM FOR FLOOD IN 2013 AND THEIR FINDING IN 2016

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ABSTRACT

The Typhoon No. 18 caused flood on 15th, September, 2013 in the Kawata River basin, Yoshinogawa City, Tokushima Prefecture. The Kawata River is a raised bed river and its river bed is 36.7 m with banks to 40.5 m above sea level. The heavy rain did not destroy the banks but made the river level 39.4 m high and then pressed the underflow channel. As the Kawatanaka primary school is situated on 36.2 m high, it was not submerged although the underflow channel overbanked on the playground. An educational program on the prevention disaster, which consists of science, social studies and presentation, was conducted to 18 students of the 4th grade students in the period of integrated study in the Kawatanaka primary school from 17th, September. On the first day, current marks from 625 holes, 30 cm to 1 mm in diameter, on the playground were observed. The flow current showed direction from SE to NW. When the students observed the current, they considered the ground tilted based on the knowledge that water runs from high to low. They made levels as their homework to make their hypothesis sure. The home made level, plastic bottle with water, showed that the ground had a tilt to NW with 1 to 2 degrees. On the bases of the difference between E to W flow of the Kawata River and their estimated current flow SE to NW on the playground and the fact that the bank of the river were not destroyed, the students suggested the heavy rain pressed the underflow channel. A junior high school student, who studied the program in 2013, found funny vertical conglomerate layers on the playground in the summer holidays in 2016, because new school buildings were constructing. The layers are the underflow channels, pipings, which they suggested in 2013, and have been proved by the running water on heavy rain days.

IMPROVING A DSM OBTAINED BY UNMANNED AERIAL VEHICLES FOR FLOOD MODELLING

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ABSTRACT

The quality of a spatial data set may convey large differences into the hydraulic flood modelling results. Currently, images acquired with Unmanned Aerial Vehicles (UAV) are seen as an alternative to traditional data sources to obtain spatial data that represent the terrain surface with a high level of detail. The objective of this study is to produce an optimal Digital Surface Runoff Model (DSRM), for input in a hydraulic flood model, by using an improved Digital Surface Model (DSM) produced with UAV´s images and GPS data. The work was carried out on an 8.5 km extent of the Lis River (Portugal) where frequent floods take place. The area is characterized to be predominantly flat with mainly shrub vegetation along the river banks. The flight was performed with the eBee UAV from Sensefly. In addition, a topographic survey of cross-sections laid-out at, approximately, 200 m intervals along the river channel was executed using a TOPCON HiPer Lite GPS in Real Time Kinematic mode. This type of GPS survey has the advantage of obtaining high precision topographic data (1-1.5 cm) and, unlike the photogrammetric survey, is able to capture channel bed features underneath the water and vegetation. The water level was measured at three hydrometric stations. A DSM contains, in addition to the elevation values of the bare ground, those of the objects on it like buildings, trees and other vegetation. A Digital Terrain Model (DTM) is obtained from the DSM by removing, or filtering, those objects. Subtraction of the DTM from the DSM gives the normalised Digital Surface Model (nDSM), i.e. a model that contains the height values of the objects. The DSRM represents coherent terrain model for flood modelling. The optimal Digital Surface Runoff Model (DSRM) was selected amongst four DSRM: 1) DSRM1, produced with the DSM in raster format, 2) DSRM2, a raster made with the DTM and the nDSM (only the pixels with height values less than 2 m), 3) DSRM3, the same as DSRM1 but integrated with the GPS data, and 4) DSRM3, the same as DSRM2 but integrated with the GPS data. A map of Manning's n roughness coefficients for the channel and floodplain was produced from the orthoimage and field survey. Hydraulic computations were made with the HEC-RAS, a model that can simulate both steady and unsteady state flow conditions. The definition of the cross-sections depends directly on the resolution of the topographic data and a total of 47 cross-sections were created with an average separation of 180 m. Two recorded stage hydrographs were used as boundary conditions and a third recorded stage hydrograph was used in the validation process of the DSRM selection. The best hydraulic results were obtained when the GPS data were used in the production of the DSM, but mainly with the DSRM4.

EFFECT OF THE SOIL-IMPLEMENT CONTACT AREA ON SOIL EROSION UNDER HOEING TILLAGE

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ABSTRACT

Few studies have reported the effect of the soil-implement contact area on soil erosion by hoeing tillage due to the uncontrollability of tillage depth and the unchangeability of hoe blade width which are two important factors of the soil-implement contact area. In this study, a series of tillage experiments were conducted with four fixed tillage depths (0.05 0.10 0.15 and 0.20 m) on 9 slopes ranging from 0.0874 to 0.5773 m m-1, then the subsequent data were compared with those acquired previously by different hoe blade widths. Tillage depth is a significant factor reflecting the soil-implement contact area especially for a constant width of hoe blade. Mean displacement distance increased with increasing tillage depth on each slope gradient, and this effect is more pronounced for larger slope gradients. Tillage translocation rates linearly increased with increasing slope gradient and quadratically increased with increasing tillage depth under the same width of hoe blades. As the other factor reflecting the soil-implement contact area, hoe blade width is a significant factor influencing tillage erosion. The wide-blade hoe in this study is proved to be more erosive than the thin-blade hoe under a similar tillage depth. Tillage transport coefficient k4 linearly increases with the increasing soil-implement contact area which is an integrated factor that contains both tillage depth and hoe blade width. It is suggested that minimizing the soil-implement contact area by either decreasing tillage depth or reducing the width of hoe blades are effective measures for combating tillage erosion.

MODELING THE TSUNAMI NATURAL HAZARD FOR THE BLACK SEA AREA

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ABSTRACT

The tsunami phenomenon represents a worldwide natural hazard, consisting of a series of atypical waves triggered by various sources: submarine earthquakes and/or landslides, underwater volcanic eruptions or lava flows, extraterrestrial collision, or a mix of sources. Evidences show 22 tsunamis observed in the past in the Black Sea area (Y. Altinok, 1999). Almost all countries surrounding the Black Sea faced tsunamis, 9 of the events were triggered in Crimea, 4 in Bulgaria area and 2 generated by inland earthquakes in Turkey. 12 of the major known events are from the 20th Century. The first historical document refer to the 1st century BC, in Bisone, on the Bulgarian shore (Nikonov, 1997). The latest event was triggered also in Bulgaria, by a submarine landslide on 7th of May 2007 (Ranguelov et al., 2008). For a better understanding of the tsunami complexity and generation sources, tsunami modellling simulations were accomplished using past earthquake paramenters for different areas in the Black Sea. There are few softwares to be used for this purpose, such as NAMIDANCE, MOST and GEOCLAW, but the Tsunami Analysis Tool (TAT) was chosen for this attempt. Other softwares might be used in the future in order to correlate and compare results. More studies were accomplished for the endangered areas mentioned above, with the highest number of tsunami events. For each one, the modeling results are quite different and varry depending on the area. Varying the depth and the magnitude and using past earthquake parameters, the results for each area are as follows: for Shabla (Bulgaria) area, the worst case scenario is for a depth of 5 km and a magnitude Mw = 8, the maximum tsunami waves heights will reach 0.8 m in Kranevo (Bulgaria), some of the affected locations are Costinesti, Mangalia, Techirghiol, with waves of 0.6 m height and 0.5 m respectively at Constanta; the modeling results for Crimea area show maximum waves of 2.2 m triggered by an earthquake of magnitude Mw = 8, with the depth of 33 km; the modeling for the western Turkey area (inland and offshore Istanbul) displays wave heights of maximum 1.59 m for an earthquake of magnitude of 7.6, at a depth of 10 km. Moreover, there are 3 locations from the Romanian shoreline affected: 0.83 m in Mangalia, 0.5 m in Techirghiol and 0.39 m in Constanta. For a better evaluation of the Black Sea tsunami possibility of occurrence, more information regarding the parameters of high magnitude earthquakes and their focal mechanism, are necessary. More computations are needed in order to have a better correlation of tsunami waves observed in the past and the results of the modeling. When sufficient data will be compiled, precautions could be taken for preventing tsunami hazards in the area.

GEOCHEMICAL CHARACTERIZATION OF SOME SELECTED MUD VOLCANOES AND TATUN VOLCANIC AREAS OF TAIWAN

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ABSTRACT

Taiwan is highly active tectonically and intensively faulted resulting in occurrence of number of big earthquakes in the region. In the northern part of Taiwan Island, a group of volcanoes are distributed. These volcanoes are known as the Tatun volcano group (TVG). In the present study we focus on Tatun volcano group (TVG) and some selected.mud volcanoes in Pingtung (Wan-Dan mud volcano) and Kaohsiung (Niau-sung mud volcano) areas The selected mud volcanoes are located above the mud diaper system in southern Taiwan. Three different sampling techniques were used to collect samples in and around the said mud volcanoes. The results show that river water samples from different places falls on the meteoric line. Mud samples are found to be heavier in oxygen isotope while hydrogen isotope remains the same. Soil gas samples were also collected at the depth of 1 meter and dissolved gases from the mud volcanic site (or nearby) for GC (Gas Chromatography) analyses. Soil gas samples and dissolved gas from mud pool and ground water were analyzed for radon concentration using RAD7 (Solid-state nuclear track detector) bi-weekly. Dissolved gas results have shown carbon dioxide values up to 9%. Whereas, ground water samples have shown high concentration of methane up to 35%. Long term investigation will be needed to understand the relationship of mud volcanoes eruption cycle with gas composition variations. It will also help to understand their relationship with tectonic activities in the region. During the past decade, volcanological, seismological and geochemical observations have shown that Tatun Volcano Group have potential for future eruptive activity. Solid state nuclear track detectors (SSNTDs) technique has been used for the measurement of radon-thoron concentrations in soil gas for this volcanic group. After the calibration of LR 115 films in radon thoron discriminator and selecting the suitable site for radon monitoring in Tatun Volcanic areas in a hole (about 50 cm depths) having different temperatures for a defined period (bi-weekly to monthly). Radon behaviour observed is different at above said sites. The observations have shown potential precursory signals for some earthquakes that occurred during the observation period having an epicenter in and around the TVG. Our monitoring stations in TVG area are sensitive to the events with in distance 60 kms. Continuous long term monitoring in these stations is required to test and verify this hypothesis in future.

METHODS OF MEASURING AND MAPPING OF LANDSLIDE AREAS

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ABSTRACT

The problem of attracting new investment areas and the inability of current zoning areas, allows us to understand why it is impossible to completely rule out building on landslide areas. Therefore, it becomes important issue of monitoring areas at risk of landslides. Only through appropriate monitoring and proper development of measurements resulting as maps of areas at risk of landslides enables us to estimate the risk and the relevant economic calculation for the realization of the anticipated investment in such areas. The results of monitoring of the surface and in-depth of the landslides are supplemented with constant observation of precipitation. The previous analyses and monitoring of landslides show that some of them are continuously active. GPS measurements, especially with laser scanning provide a unique activity data aquired on the surface of each individual landslide. The development of high resolution numerical models of terrain and the creation of differential models based on subsequent measurements, informs us about the size of deformation, both in units of distance (displacements) and volume. The compatibility of the data with information from in-depth monitoring allows the generation of a very reliable in-depth model of landslide, and as a result proper calculation of the volume of colluvium. In the article, presented programs are a very effective tool to generate in-depth model of landslide. In Poland, the steps taken under the SOPO project i.e. the monitoring and description of landslides are absolutely necessary for social and economical reasons and they may have a significant impact on the economy and finances of individual municipalities and also a whole country economy.

EVALUATION OF THE SITE EFFECT (APPLICATION OF THE HVSR AMBIENT NOISE METHOD) AT THE SITE OF THE GREAT AFRICAN MUSEUM (ALGIERS)

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ABSTRACT

The site effect evaluation consists of determining the proper resonance frequency of the soil and the level of amplification of the site studied. Considered as an essential tool for prevention and reduction of seismic hazard. However, each building by its nature, structure and its number of stages also has its own frequency for which vibrates "resonance frequency of building", if the soil vibrates at this frequency the building enters In resonance which explains the destruction of the buildings away from the epicentral zone. The objective of this work is to apply HVSR ambient noise method to determinate the site effect hazard at the location of the great museum of Africa located in the region of Algeria At the mouth of el Harrach wadi, while relying on the seismic hazard as well as the geotechnical nature of the soils. This technique was proposed for the first time in Japan by Nogoshi and Igarashi (1970 and 1971), then disseminated by Nakamura (1989). This method was implemented for the first time on a large scale in Algeria in Boumerdes following the earthquake of 21 May 2003, jointly by the CGS (National Research Center Applied to Parasismic Engineering) and the LGIT (Laboratory of Inner Geophysics and Tectonophysics, Grenoble). The H/V recording campaign allowed the detection of 3 peaks at different frequencies, each peak corresponds to an interface between two layers with high impedance contrast, the presence of several peaks indicates the presence of several amplifying sedimentary layers.

SENSITIVITY ANALYSIS OF METHODS FOR FLOOD HAZARD MAPPING

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ABSTRACT

Flood risk management is focused on the reduction of the flood hazard through the reduction of the floods severity. In Europe, the Floods Directive (European Commission, 2007) requires Member States to prepare flood hazard maps. The experience has shown that national scale maps compiled in the ambit of the Directive are produced from flood hazard studies developed at different spatial scales (unit of management or river basin), often using spatial data with different accuracy, and diverse hydraulic flood models and flood hazard mapping methods. The flood hazard is the potential for inundation that involves risk to life, health, property, and environment. Flood hazard comprises three elements: severity (magnitude or intensity, duration, and flood extent), probability of occurrence, and speed of onset of flooding. A flood hazard map represents the spatial distribution of the flood hazard, i.e. the information on the probability of occurrence of a potentially damaging flood event of a certain magnitude within a given time period and area. The flood hazard maps are useful for raising awareness among people at risk and also on the decision makers, providing information for land use planning and urban development, serving also as valuable information for flood insurance premiums establishment. Notwithstanding, this information should also be disseminated among the communities in flood prone areas to engage them in preparedness. The criteria used to mapping of flood hazard may be based on different thresholds of water depth, flow velocity and/or of intensity, and on the effect of debris and allow one to represent flood hazard by a different number of categories, usually three or five, resulting, subsequently, in different flood hazard maps. The main objective of this study is to provide a sensitivity analysis of six methods for flood hazard mapping developed by various regional or national agencies responsible for flood risk management. This analysis was done for five fluvial flood prone areas in Portugal. The Portuguese Environment Agency carried out flood modelling for these areas and made available water depth and flow velocity for floods with medium probability of occurrence (return period = 100 years). All of the six methods use both water depth and flow velocity, provided by the hydrodynamic modelling associated with an occurrence probability, to map flood hazard, whilst the effect of debris is not taken into account. These different approaches have consequences in both flood risk mapping and flood risk management plans.

PHYSICALLY BASED MODELLING OF DEBRIS FLOW EVENTS AND PROTECTION MEASURES IN MOUNTAIN AREAS OF NORTHERN PERU

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ABSTRACT

In the study of river hydraulics today must take into account many important factors judiciously tools in computational fluid dynamics (CFD). It is no longer acceptable to solve an engineering problem of rivers by using empirical formulas in general cases, therefore it has to be carried out a detailed study of morphological processes in mountain streams taking into account the hydrodynamics of rapid mass movements. This research aims to the use of FLO2D physically based models to simulate extreme events in Hualapampa creek and its tributaries in the vicinity of New Hualapampa city and Federico Belaunde Terry highway to debris and mud flows generated by heavy rainstorms, as well as to evaluate the capabilities and ways of help of the model. Grain size distribution of sediment in each tributary and the main creek were studied in laboratory and determined main properties. Rainfall and dischargue were assessed by hydrological modelling and daily-hourly information obtained by governmental institutions. The proposed protection elements to be included in the study area are riverbank defenses on unstable slopes serving as protection in the vicinity, as well as the piles and abutments belonging to a bridge of the highway. The calibration was based taking into account the last event occurred in April 2017.Finally one can predict in the study site possible areas of erosion as a warning for riverbank protection and deposition zones and to determine adequate hydraulic capacity or imply riverbed-cleaning works, as well as hazard maps with different intensities.

ASBESTOS UTILIZATION COSTS ON THE EXAMPLE OF FUNCTIONING LANDFILL OF HAZARDOUS WASTE

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ABSTRACT

Asbestos is a trademark of mineral fibers, which are the natural minerals found in nature. Products containing asbestos fibers,in accordance to national and EU legislation, are covered by the production prohibition and used due to their harmfulness resulting on human health. In Poland, the asbestos removal process was started with the adaptation EU law by the Council of Ministers Treatment Program of the National Asbestos for the years 2009-2032. The purpose of the disertation was to analyze the costs associated with disposal of the costs of collection, transport and disposal of waste. Methodology consisted in obtaining information on the raw materials needed to produce asbestos sheets. The analysis allowed us to determine the cost of disposal of asbestos and determination of cost including state subsidies.

A COST-ASSESSMENT OF WASTE MANAGEMENT MEDICAL AND VETERINARY IN THE COMMUNITY GRYBÓW

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ABSTRACT

The main purpose of the paper was the cost-assessment analysis of the medical and veterinary waste management in the local community in Lesser Poland Voivodeship (Poland). This article describes management system of medical and veterinary waste in Poland, the basic concepts related to the management. It was presented the amount of produced medical and veterinary waste in the local community with cost analysis associated with the disposal and transportation of hazardous waste and revenue in the form of subventions from the state budget in 2011-2015. Subventions from the state budget for management of medical and veterinary waste depends on the amount of generated waste. Subsidies allocated for waste management of medical and veterinary fulfil costs for disposal and transportation so the community not bear additional costs. The costs of transportation depends on the rate of pay, which the company sets for running 1km and the distance from company to collection point and the point of delivery and the cost of disposal of medical and veterinary waste influenced by the amount of waste generated and the price for their disposal.

A COST-ASSESSMENT OF THE FUNCTIONING OF A LOCAL VEHICLE JUNKYARD

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ABSTRACT

The purpose of the paper was to analyze the costs of recycling vehicles at local vehicle scrapping facility. The article contains regulations concerning vehicle decommissioning, describes the types of recovery, vehicles recycling networks, analyzes the structure of the disassembly station, as well as the financial and institutional system in charge of dealing with the recycling of vehicles in Poland. In the paper authors present the number of scrapped vehicles at local scrapping facility and the level of achieved recovery and recycling. The research presented in the article shows financial situation of the vehicle scrapping industry. In addition, it has been observed that the amount of subsidies are directly proportional to the number of scrapped vehicles, and achieved levels of recycling and recovery depends on the percentage of incomplete vehicles.

EARTHQUAKE PRECURSOR STUDY BY NONLINEAR AND STATISTICAL ANALYSIS

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ABSTRACT

Earthquake is one of the most destructive phenomenon in terms loss of properties and lives among other natural calamities. However earthquake prediction is still in infant phase. The research on earthquake prediction appears to be a challenging task for scientists throughout the globe. In past few decades numerous geophysical and geochemical techniques have been implemented to observe the precursory signals for earthquake. These signals seem to be most trustworthy tool concerning various interacting features (physio-chemical processes) within the deep that helps to estimate earthquake preparation phase. In present work we have opted gas geochemical approach by monitoring the variation of several geochemical gas emanated from deep earth. Recently a research project had been under taken by NIT Durgapur, India to create a baseline evidence on the relationship between variations of gas concentration with imminent seismic events in the context of the Indian geophysical scenario by measuring concentration of several hot spring gases and soil gases in the different geothermal area. An automated continuous gas monitoring facility has been build up by the research group of NIT Durgapur in different places located in dissimilar seismic zones of the country. Geochemical and geophysical precursor signals from the earth interior are basically nonlinear in nature. In the present paper, some well-known statistical and nonlinear techniques are applied on recorded gas geochemical time series data. The entire effort helps to comprehend the underlying dynamics of seismic induced geochemical data recorded on different field laboratories in India. Results from preliminary statistical and temporal variation of concentration of gas geochemical data shows several anomalous fluctuation in concentration of spring gas and soil gas that appears to be basic evidence for in earthquake prediction. Nevertheless, the observed anomaly present in time series geochemical data is also distinguished by different nonlinear techniques to detect the precursory signals to some moderate to major earthquakes occurred in the vicinity of the aforesaid geothermal area. Detailed discussions have been made in this paper. Time series analysis of geochemical data through both statistical investigation and nonlinear dynamical analysis becomes very novel way for earthquake precursor study apart from other geochemical and geophysical approach.

DIPDAS: DEVELOPMENT OF WEB-BASED DISASTER PREDICTION AND DAMAGE ASSESSMENT SYSTEM

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ABSTRACT

Large-scale disasters will always happen-often without warning. Recently, the frequency and size of large natural disasters due to climate change have been continuously increasing, but there is insufficient technology to calculate the estimated amount of damages in the area where the disaster prevention policy is established. Damage is divided into direct and indirect damage. Unlike direct damages of buildings and facilities damaged by disasters, there is no research to estimate indirect (operational) damages such as loss of sales caused by business interruption. DIPDAS (Disaster Prediction and Damage ASsessment) is a system that predicts flood damage. It provides indirect damage such as disruption and loss of business affected by direct damages to facilities as well as direct damages caused by flood disasters caused by typhoons, heavy rains, etc. It utilizes the big data such as predicted weather information, flood depth, building property / spatial information, credit card transaction information, news from the Internet, and real estate price. More detail information about DIPDAS is as follows. ? Local Vulnerability Estimation Function: Provides local flood vulnerability using disaster history extracted from texts such as news, disaster daily and annual report. ? Direct Damage Prediction Function: Provides direct damage in building units, and these are the damage ratio of buildings, building 5 damage costs, flood victims, damage costs of industry, and costs of casualties. ? Indirect (Operational) Damage Estimation Function: Provides the amount of estimated economic damages due to downtime caused by inundation damage. It is calculated based on (1) ordinary sales forecasts by block (the smallest unit of the affected area), (2) estimated duration of business interruption by flood depth, and (3) local vulnerability. The amount of damages is calculated by block or administrative unit. ? Damage Simulation Function: Visualizes the amount of direct and indirect damages based on spatial information according to the depth of flooding. It can be seen that even though the same flood depth, the level of damage varies depending on the business categories of current stores/companies and their sales amount as well as the geographic location. Simulating disaster can provide valuable information that helps emergency planners modify evacuation plans. ? Damage Level: It is a damage level that is used during damage assessment to define the level of risk by considering the amount of damage. This is a mechanism to increase visibility of risks and assist management decision making. Finally, all data produced by DIPDAS can be exported as a spatial information file (.shp) and used in external GIS tools such as ArcGIS and QGIS. We expect that DIPDAS could contribute to decision makers to efficiently and effectively manage the damage caused by natural disasters.

ORGANIC GEOCHEMICAL CHARACTERISTICS AND HYDROCARBON POTENTIAL OF TERTIARY ALPAGUT-DODURGA COALS IN CORUM BASIN, TURKEY

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ABSTRACT

This study have been conducted to evaluate the determination of organic geochemical characteristics with Lower-Middle Miocene aged Sub Bituminous coal located in Çorum Basin and hydrocarbon potential and plus paleo-depositional environmental characteristics. In this context, compiled representation of the coal samples from the three coal fields from Northern Çorum (Incesu, Evlik and Alpagut-Dodurga) were performed as detailed organic geochemical and organic petrographic analysis. Organic geochemical evaluations utilizing TOC-Rock-Eval pyrolysis analysis, gas chromatography, gas chromatography-mass spectrometry analysis are performed and determined the amount of organic matter that formed the coals, type and effective agents in the coal formation process. Results of the Rock-Eval analysis of coal samples indicate that the dominant kerogen type III and type II / III mixture. Organic compounds of coals consist of mainly huminite group macerals, and lesser liptinite and inertinite groups. According to petrographic and biomarker data of these coals, depositional environment was the reeds / forest swamp or a lake swamp. Although the probability of such an occurrence, rather than gas derived from petroleum potential for organic matter content and type of coal is very low due to the low maturity.

THE COALIFICATION PROCESS AND USE OF BIOMARKER DATA IN THE DETERMINATION OF PALEOENVIRONMENTAL CHARACTERISTICS OF MIOCENE-PLIOCENE COALS (KANGAL-SIVAS, TURKEY)

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ABSTRACT

This study has done related to paleoenvironmental features of Kangal coal-bearing units, in the south of the Sivas Basin. The total thickness of this unit is about 80 m, but only 64.56 m where workable coal seams are present. The coal-bearing series, from its base upward, comprises a sequence of clay, coaly clay, coal, carbonaceous shale, marl, and tuff with traces of coal. Around Kalburcayiri, the average thickness of each of the two coal seams approximately 10 m are currently being exploited based on open-cast methods, the coal from which is used by the nearby lignite-fired Kangal power station. In the studied samples, n-alkanes vary in the range C12–C35. The n-alkane distributions of the coals from the Kalburcayiri area indicate that either mid-chain (n-C21–25) or long chain (n-C27–32) compounds dominate. The distributions of the C27 and C28–C29 steranes for all these coal samples are very similar (C29 > C27 > C28). The compositions of biomarkers imply that the coal-forming plants were mostly angiosperms, but with minor contribution of gymnosperms. The type and abundance of hopane detected in the investigated coals imply bacterial activity and also an immature to early-mature stage for the organic matter or a diagenetic alteration of the biomass, as confirmed by huminite-reflectance measurements. The original landscape was that of a lake basin that hosted a coal forming swamp environment, and this lake was of varying depth and character due to various paleotopographic uplifts.

HYDROCARBON POTENTIAL OF JURASSIC SOURCE ROCK IN THE GUIANA-SURINAME BASIN

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ABSTRACT

In the ultra-deep offshore area of Suriname, seismic data was acquired in 2013 by Staatsolie Maatschappij Suriname N.V. This data would enable Staatsolie to evaluate the hydrocarbon potential of this area, which previously had no data coverage. The Post Rift Sequence of the Equatorial Atlantic has been evaluated for hydrocarbon potential, which incorporates the Mid Cretaceous to Quaternary sediment package. A Regional Depositional Model was used to predict what reservoirs can be expected in the study area. The Porosities and Permeabilities of the different leads were estimated, based on their depths below the mud line. The results suggest two Petroleum Systems, which are suggested to feed thirteen leads through a simple migration model. The Geological Chance of Success of these leads are varying between 5.04% and 18.14%, which are consistent with Chance of Success in Frontier Basins. A ranking of these leads is proposed based on Estimated Volume (P50), Geological Chance of Success (COS), Water depth and Depth of Lead below sea bed. Two (2) Petroleum Systems were identified. A more comprehensive Petroleum Study is proposed to better understand the true potential of these two Source Kitchens and its migration pathways.

PETROGRAPHIC COMPOSITION OF LIGNITE FROM THE LAKE SOMERVILLE SPILLWAY (EAST-CENTRAL TEXAS)

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ABSTRACT

In the presented paper, the macroscopic and microscopic composition of lignite from Lake Somerville Spillway has been examined. The study area is the upper part of the Manning Formation, located north-west of Somerville in the central-eastern part of Texas. There are three exposures: NE, SW and MC (Main Central) with visible parts of late-Eocene lignite seams belonging to the Jackson Group. The Manning section is divided into four marine dominated parasequences (P1 through P4). Lignite samples outlining the P1 parasequence from the MC and NE outcrops and the argillate sample from the lower part of the P2 parasequence, NE outcrop. Macroscopic characterization was carried out based on lithological classifications of humic coal, that is according to Kwiecinska and Wagner (1997) and Teichmüller (1989). On this basis, it has been shown that the main lithotype occurring in the deposit is detritic (matrix) coal with a high share of mineral matter. The maceral composition of coal was determined according to the ICCP guidelines. The macerals from liptinite group were determined under fluorescent light. The maceral group content analysis was performed with use of 500-600 equally spaced points on the surface of the polished sections. It has been found that the examined coal is dominated by macerals from the huminite group, with a share ranging from 20.8 to 65.3% volume, including atrinite (9.8-22.8% volume, 17.5% volume on average). In the examined coal, macerals from the inertinite group (10.1 to 44.8%), especially semifusinite (max. 13.9%), fusinite (max. 9.3%) and funginite (max. 6.3 %) are of particularly large share. In the liptinite group, particular attention was paid to the content of alginite (max. 4.5%) and bituminite (max. 1.3 %), which indicate the paralic sedimentation environment of the examined coal. Additionally, the variability of macerals and maceral groups within the exposures and levels of the P1 parasequence was examined. The last step was to compare lignite from Lake Somerville Spillway with other lignites belonging to the Jackson Group, namely Gibbons Creek and San Miguel lignite mines.

IN-SITU STRESS FIELD OF FANZHUANG BLOCK IN QINSHUI BASIN AND ITS IMPACT ON WATER AND GAS PRODUCTION

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ABSTRACT

Geostress is a crucial factor that affects the in-situ permeability and reservoir stimulation, and thus the performance of coalbed methane (CBM) recovery from coal. To better understand its influence on gas and water productions of CBM wells, the geostress was systematically investigated based on pressure-time records of the hydraulic fracturing of 238 CBM wells collected from Fanzhuang block in Qinshui Basin of China. The results show the vertical stress, maximum and minimum horizontal principal stresses range from 5.92 to 20.08 MPa, 8.03 to 41.75 MPa and 5.38 to 21.24 MPa, respectively. The principal stress increases with burial depth of coal seams as a power function. The stress magnitude is generally associated with fault conditions in the Fanzhuang Block, where is dominated by the reversed and strike-slip faulting stress regimes, and is only 8 % under normal fault condition. Most of the reverse fault conditions are developed in the burial depth shallower than 500 m, while the normal and strike faulting stress regimes mainly occur with the burial depth deeper than 500 m. The relation between the coefficient of lateral stress and burial depth shows that the shallow strata are generally dominated by the horizontal stress and the deep strata tend to the hydrostatic pressure field with approximately equal principal stress. Relatively low gas production and higher water production are associated with the inferred vertical hydraulic fractures of CBM wells where the least horizontal principal stress is the minimum stress, whereas relatively high gas and lower water production are observed in the inferred horizontal hydraulic fractures where the vertical stress is the minimum stress. This is attributed to the influence of geostress on natural and artificially enhanced permeabilities of the coal seam and its interaction with overlying or underlying aquifer during the switch of the minimum stress between vertical and the least horizontal stresses. The analysis of the microseismic fracture monitoring from 72 CBM wells shows that the orientation of the maximum horizontal principal stress concentrates in the NEE~NE direction and locally distorted by the faults, which can be further applied to optimize the CBM well drilling, completion and stimulation in the studied area.

INVESTIGATION OF POLYMER AND SURFACTANT ADSORPTION ON GLASS SLIDES AND CRUSHED CORES IN ALKALINE-SURFACTANT-POLYMER EOR METHOD

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ABSTRACT

Alkaline Surfactant Polymer (ASP) flooding is one of the chemical flooding methods where the synergistic effect of three chemicals (alkaline, surfactant and polymer) is utilized. The method is the current world wide focus of research and chemical trials in EOR. It can provide an incremental oil recovery over the waterflood of 5-27% OOIP (Sheng, 2013). However for this method to be economically feasible; it is crucial to minimize the loss of chemicals to the reservoir i.e. adsorption. Rima field located in center of Oman was evaluated as an attractive opportunity for ASP development. It is a sandstone reservoir containing medium to light oil of 33 oAPI and a viscosity of 9cP. Several lab experiments were conducted by PDO on the reservoir rock and fluid samples to assess the potential of ASP application. From coreflood experiments; high adsorption rates were seen. Hence this dissertation is dedicated to experimentally investigate the adsorption of surfactant and polymer by focusing on its morphology, binding energy and chemical composition. Rima crushed cores samples and brine were used in the experiments as well as the potential polymer and surfactant to be used for the field ASP development. In addition, glass slides were used as a substrate. The adsorption morphology was studied using AFM and TEM; while the adsorption chemical composition and binding energy was studied using XPS. In addition; the salinity, pH and surfactant effects on adsorption were tested. The study demonstrated the polymer and surfactant adsorption through their binding energy and morphology images. A clear polymer desorption is seen while adding the surfactant in all experiments and a proportional relationship was established between increasing salinity and adsorption; while the pH effect induce a fluctuating trend that is caused by different minerals available in Rima core.

ALKALINE-BIOSURFACTANT-BIOPOLYMER PROCESS AND ITS POTENTIAL FOR ENHANCING OIL RECOVERY IN OMANI OIL FIELD

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ABSTRACT

Until now Alkaline-Surfactant-Polymer (ASP) studies have been carried out using chemical surfactants and polymers. This experimental investigation was performed to evaluate the possibility of using a biosurfactant and a biopolymer with sodium carbonate as a basis for ASP flooding for an Omani oil field. The reservoir was characterized as a potential candidate for ASP flooding having favorable properties such as high permeability (500-1000 mD), low oil viscosity (20-25 cp), favorable total acid number (0.1 mg KOH/g Oil) and high residual saturation (>20%). The study was done to design an optimum composition of Alkali/Biosurfactant/Biopolymer (AbSbP) slug and apply it for enhancing oil recovery in both reservoir cores and Berea cores. The interfacial tension between various solutions containing alkali, biosurfactant and biopolymer was measured. Interfacial tension values in the range of 0.02-0.1mN/m were achieved at low biosurfactant and alkali concentrations. The interaction of the biopolymer with the brine, biosurfactant and alkali was investigated in terms of their effect on its viscosity at reservoir temperature of 50 ?C. An AbSbP slug containing 1.1 wt.% sodium carbonate, 20 v/v% biosurfactant broth and 20 v/v% biopolymer broth has been recommended for the final core flooding experiment. Core flooding experiments were conducted using reservoir cores and Berea cores by injecting the formulated AbS and AbSbP slugs after brine flooding. Maximum additional oil recovery obtained was 14% and 32% OIIP from the reservoir cores and Berea cores respectively. Such difference in additional recovery was mainly due to the vast difference in the mineralogical composition of the two rock types.

CHARACTERISTICS AND FORMATION MECHANISM OF MULTY-LAYER DISTRIBUTION OF DAWSONITE IN THE HONGGANG OILFIELD, SONGLIAO BASIN

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ABSTRACT

CHARACTERISTICS AND FORMATION MECHANISM OF MULTY-LAYER DISTRIBUTION OF DAWSONITE IN THE HONGGANG OILFIELD, SONGLIAO BASIN Li Liu, Xiaoran Ming, Na Liu, Lei Yu, Chunyan Hu College of Earth Sciences,Jilin University,Changchun 130061,China ABSTRACT The distribution of dawsonite cement, blamed for poor reservoir quality in the Upper Cretaceous sandstone of the Qingshankou Formation in Songliao basin, China, has been investigated using petrography, X-ray diffraction and stable isotopes. Dawsonite cement is usually appeared as a feature of multi-layer cementation that is separated by mudstone interlayers. The dawsonite-cemented layer is characteristic of high content of dawsonite and narrow distribution range of carbon isotope. The rock types of mudstone interlayers include dawsonite-bearing mudstone, dolomite-bearing mudstone and illite-bearing mudstone. The rock types of mudstone caprock are dawsonite-bearing mudstone and dolomite-bearing mudstone from bottom to top. Isotopic data show that dawsonite in mudstone grew in the presence of carbon dioxide with a ?13C value of about -0.9 to-1.5 ?. This is consistent with the carbon isotope ratio of the gas phase carbon dioxide now present in the sandstone (-6.6 to -3.73 ?), which had an mantle-magmatic source origin. it can be deduced that CO2 in the gas reservoir and CO2 for dawsonite genesis had the same C source, the major contribution of which came from mantle-magmatic CO2.The dawsonite in the mudstone derived from the mantle CO2 fluid that diffused upward in the underlying sandstone. The formation of multi-layer dawsonite cemented zone is mostly related to the lateral migration of mantle CO2 fluid and partially related to the upward diffusion of mantle CO2 fluid from underlying sandstone. The thick mudstone caprock and the mudstone interlayers maintained the high partial pressure of mantle CO2 fluid in sandstone layer efficiently, providing a relative enclosed environment that formed the dawsonite cement.

This research is funded by the National Natural Science Foundation of China (No. 41172091 and No. 41572082).

ESTIMATION OF THE SHALE GAS PRODUCTION POTENTIAL

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ABSTRACT

During last 10 years unconventional gas resources became attracted and turned into a subject of interest both for the oil industry and widely understood energy sector. At the same the reason of the increasing the attention towards the topic are significant resources of gas and technological progress in the development in unconventional natural gas extraction technologies. A well known example of the success of the commercial shale gas extraction belongs to the USA, where production of shale gas grew from a negligible amount in 2000 to about one third of the U.S. natural gas consumption in 2012. Traditionally to provide deterministic estimates used Decline Curve Analysis (DCA). But deterministic estimation contains significant uncertainly. As a result, the deterministic prediction of future decline is often far from the actual future production trend. Current U.S. Energy Information Administration methods of projecting shale gas production are based on county level Estimated Ultimate Recovery EUR average of well productivity and estimated well drainage areas. The shale rock containing gas does not represent traditionally understood collector with essential permeability and differences of the pressure within the system of drill-hole-collector. That why traditional methods of the estimation shale gas resources such as Gas in Place (OGIP) and Estimated Ultimate Recovery (EUR) couldn't give us full information about recoverable resources, especially on the exploration stage, were there is no production history. The idea of my research project is to investigate using statistical metods how mechanical and quality properties of shale rock could influence to the future shale gas production. Model will help investors decrease risks during the investment decisions on the shale gas exploration projects.

ANALYSIS PETROPHYSICAL PARAMETERS ZONE 4 FIELD OF HASSI MESSAOUD-ALGERIA

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ABSTRACT

The field of Hassi Messaoud divided into 24 zones, is located 850 km southeast of Algiers and 300 km from the Algerian-Tunisian border. It represents the largest deposit of the Triassic province (Boudjemaa 1987). Zone 4 is a part of the Hassi Messaoud field that has undergone an intense polyphase tectonics (Kenane, 2015) has developed a set of faults and fractures. They affected the various reservoirs levels and changed their geometries (compartmentalization) and their petrophysical parameters. From the analysis of maps contours in isoporosité and isoperméabilité and different histograms lineaments and fractures that we have established, we demonstrated that in Zone 4 and throughout the Hassi Messaoud field directions mainly: NE-SW, NW-SE, EW and NS. Moreover the work of Beicip (2004) showed that the dynamic point of view the lineaments drivers have a direction E-W. The analysis of imaging data allowed us to identify fractures whose directions are: NNE-SSW, NE-SW, NW-SE, N-S and E-W. We find that remained open fractures are oriented NE-SW. Permeability measurements (fracture permeability) and porosity incidentally reveal the presence of indicia of the influence of the fractures on the flow of hydrocarbons. We can see that, although the correlation diagrams between porosity and permeability show that we are in the presence of cement tanks. They behave as compact tanks because these diagrams reveal the existence of points outside the cloud corresponding to small values of permeability and porosity (less than 6% porosity) .This is also demonstrated by the test wells which shows a flow pattern dual porosity, at least in a well (Bour, 1997). In conclusion we can summarize our analysis that the fracture network in the field of Hassi Messaoud plays a positive role in the flow of oil can be by area or can be per well. We must not also hide the negative role of these accidents (Louifi, 2006) that create permeability barriers and compartmentalize the field.

EVALUATION OF SKIN AND PSEUDO-SKINS FOR WELLS LOCATED IN THE OIL FIELD

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ABSTRACT

The interpretation of well tests is a tool for the detection of well and reservoir problems, which based on the determination of several parameters such as permeability, skin, average reservoir pressure, flow capacity (kh), effective length, boundary reservoir, and type of wellbore storage, etc. The knowledge of these parameters will allow us to make the production forecast and the resolution of production problems. For this, We have chosen six production wells located in the Haoud Berkaoui oil field, the interpretation of well tests was done by the use of software based on modern methodology of well testing. Skin factors measured during well tests can be caused by several parameters. In this work, the effects of pseudo skins such as, perforations, damage, deviation and partial perforations, multiphase, multilayer, injection and fissure are considered for each well. The study of skins and pseudo-skins allowed us to have the state of reservoir and wells. The obtained results concerning the skin and the various pseudo-skins show that the damage skin is the major component of the total skin values in comparison to other pseudo-skins. We note that the perforation skin is negative, this indicates that the perforation improve the production of wells. For all studied wells the partial penetration skin is positive, this confirms that the perforated part has an impact on the production. Given that the majority of wells are affected by a positive damage skin, these wells require stimulation

EVIDENCE OF MULTI-COMPONENT ION EXCHANGE IN DOLOMITE FORMATION DURING LOW SALINITY WATERFLOODING

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ABSTRACT

Low salinity waterflooding is a technique performed in many oil reservoirs around the globe. The technique is simply implemented by injecting water with very low ionic activity compared to formation water into injection well. The injected water will increase reservoir pressure that is compulsory to drive oil moving toward production well. More than just maintaining reservoir pressure as obtained from conventional waterflooding, low salinity water creates shifting of surface condition, resulting in additional amount of liberated oil. Nevertheless, exact oil recovery mechanisms are still discussed. Among these proposed mechanisms, Multi-component Ion Exchange (MIE) together with wettability alteration is believed to be a major mechanism leading to higher oil recovery compared to conventional waterfooding. In this study, detection of calcium and magnesium ions which are Potential Determining Ions (PDI) for carbonate reservoirs are detected during the coreflood experiment. Dolomite rock sample is used to represent carbonate formation and detection of previously mentioned ions is performed by complexometric titration of effluent. From the study, it is observed that during conventional waterflooding and low salinity waterflooding at low temperature of 30 Celsius, calcium and magnesium ions in the produced water is increased compared to the amount of these ions in injected water. This incremental of ions can be explained by the dissolution of calcium and magnesium from dolomite which is chemically composed of calcium magnesium carbonate. At this temperature, the portion of calcium ion is always less than magnesium ion even though the amount of calcium ion is higher than magnesium ion in injected water. However, at higher temperatures which are 50 and 70 Celsius, ratio of calcium and magnesium ions in injected and produced water is reversed. Disappearance of magnesium ion in effluent is more pronounced especially at 70 Celsius and by low salinity waterflooding. This can be explained that at lower temperature, disappearance of calcium ion is higher due to forming of calcium carboxylate complex with oil and at higher temperature, disappearance of magnesium ion also appears as magnesium can start to form magnesium carboxylate complex with oil and hence, amount of both calcium and magnesium ions are decreased compared to lower temperature. In dolomite reservoir, since both calcium ion and magnesium ion are provided from dissolution mechanism, the benefit from multi-component ion exchange will occur at high temperature as both calcium and magnesium ions will be consumed for oil recovery mechanism.

SEDIMENT YIELD ASSESSMENT OVER THIRTY THREE YEARS OF MONITORING IN THE UPPER KEBIR CATCHMENT, NORTHEAST OF ALGERIA

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ABSTRACT

Soil erosion that occurs within fluvial basins has a significant impact on landscape degradation, reservoir siltation and on decreasing agricultural productivity. Sediment transfer in Algerian river basins is being high and the deposit material in Algerian dams has provoked an important loss of annual water storage rate that is ranging between 2 and 5%. Recently a sediment inventory made on 77 catchments in Algeria has shown that sediment yield ranges between 93 and 44000 Tkm-2 yr-1. The scarcity or discontinuity on sediment transport measurements reduces knowledge about soil loss and its impact on human life. In some cases, such in the northeast of Algeria, researchers find often difficulties to apply the most suitable methods to estimate sediment yield. The present work represents an assessment of suspended sediment yield from the Upper Kebir catchment (1068 km2) over 33 years (from 1973 to 2006). Long-term annual suspended sediment loads are estimated using non-linear power model, developed on mean discharge class technique as sediment rating curves. A second aim is to examine monthly and annual variations in discharge, suspended concentration rainfall and load in the study catchment and to find causes for these variations. The results of this study show that the mean annual sediment yield is equal to 857.74 T km-2 yr-1 during the study period. Moreover, the long term variability analysis of sediment load seems to be very high from year to year depending on climatic conditions. The analysis of annual sediment load shows a decreasing trend along 33 years; while annual precipitation has shown an upward trend. At a decadal scale, we notice that, the study area has shown an increase in soil erosion during the second decade (1983 to 1993), where sediment yield has reached a maximum of 1027 Tkm-2yr-1. Most sediment loads are transported during the winter season, which represents 57% of the total sediment load. With such high level of erosion rate, the Upper Kebir catchment is considered as one of the most degraded hydro-system in the northeast of Algeria. The understanding of sediment transport relationships gained from this study should provide a good starting point for managers and policymakers to begin addressing sediment issues within the catchment.

EXTRACTION AND VALIDATION OF GEOMORPHOLOGICAL FEATURES FROM EU-DEM IN THE VICINITY OF THE MYGDONIA BASIN, NORTHERN GREECE

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ABSTRACT

The European Union Digital Elevation Model (EU-DEM) is a relatively new, hybrid elevation product principally based on SRTM DEM and ASTER GDEM data, but also publically available Russian topographic maps for regions north of 60? N. More specifically, EU-DEM is a Digital Surface Model (DSM) over Europe from the Global Monitoring for Environment and Security (GMES) Reference Data Access (RDA) project - a realisation of the Copernicus (former GMES) programme, managed by the European Commission/DG Enterprise and Industry. Even if EU-DEM is indeed more reliable in terms of elevation accuracy than its constituents, it ought to be noted that it is not representative of the original elevation measurements, but is rather a secondary (mathematical) product. Therefore, for specific applications, such as those of geomorphological interest, artefacts may be induced. To this end, the purpose of this paper is to investigate the performance of EU-DEM for geomorphological applications and compare it against other available datasets, i.e. topographic maps and (almost) global DEMs such as SRTM, ASTER-GDEM and WorldDEMT. The investigation is carried out in Central Macedonia, Northern Greece, in the vicinity of the Mygdonia basin, which corresponds to an area of particular interest for several geoscience applications. This area has also been serving as a test site for the systematic validation of DEMs for more than a decade. Consequently, extensive elevation datasets and experience have been accumulated over the years, rendering the evaluation of new elevation products a coherent and useful exercise on a local to regional scale. In this context, relief classification, drainage basin delineation, slope and slope aspect, as well as extraction and classification of drainage network are performed and validated among the aforementioned elevation sources. The achieved results focus on qualitative and quantitative aspects of automatic geomorphological feature extraction from EU-DEM at a water basin level, with the use of Geographical Information Systems (GIS).

STORM SERIES IMPACT AND CLIFF RETREAT OBSERVED AT BANSIN (GERMANY)

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ABSTRACT

Since the mid-twentieth century the number of extreme storm surges in the Baltic Sea is increasing steadily, which in turn together with milder winters and limited ice cover - exacerbate coastal erosion. Along Bansin (Germany) wide beach protects cliff base and cliff coastal cell dynamics is observed to change mainly as a response to significant storm events. Though the morphology of cliff coasts is shaped not only by single storm surges or by number of accompanying processes such as precipitation. Much wider effects are linked to the occurrence of a series of subsequent storm surges of different parameters. This research uses a set of LiDAR surveys from November 2016 to April 2017 to determine short-term cliff erosion associated with two major storm surges. Following the initial survey four additional surveys were performed to monitor in details complete coastal changes: the whole cliff profile as well as the topography of the adjacent beach. Results indicate an important reduction in the beach levels as a first important effect. Frequency of the storm events unbaled the beach to recover in between which allowed waves to directly attach the cliff base. Finally the whole cliff face have been changed. This work demonstrates that the development of the coastline is not only directly linked with the rate of erosion at given storm parameters (timespan, energy, maximum significant wave height, wave direction, sea level or amount of precipitation) but it have to be considered in the light of not only magnitude but especially frequency of extreme events.

GEOCHEMISTRY OF HEAVY METAL IN ESTUARIES (CASE STUDY: SEFIDRUD RIVER)

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ABSTRACT

Estuaries could be considered as a chemical mass balance zone for heavy metals transferring from continents to sea. In effect of mixing of rivers fresh water with seas salt water in estuaries, a large amount of colloidal heavy metals change in the form of flock. In addition, a large amount of heavy metals of suspended particulate matters (SPM), transferring from river to sea through estuary, might be released from SPMs and change into the dissolved form. In this study, flocculation and adsorption-desorption process of Zn, Pb, Mn, Cu and Ni by SPMs are studied experimentally. Results indicate that during estuarine mixing, Zn, Cu, Ni and Mn are respectively fluctuated by 100, 55, 41 and 4 percent. Adsorption-desorption experiment shows that during mixing of Sefidrud River with Caspian Sea water Mn and Cu released from particles respectively by 531 and 5.4 ppm while three elements of Zn, Pb and Ni are respectively adsorbed by SPMs by 19, 18 and 1 ppm. Cluster analysis (CA) shows that flocculation of zinc is governed by salinity, pH and ORP and Flocculation of copper is controlled by Dissolved Oxygen. In addition cluster analysis shows that Oxidation-Reduction potential makes manganese desorbed from SPMs.

U-PB DETRITAL ZIRCON AGES IN "NUMIDIAN TYPE" SANDSTONES FROM SOUTHERN APENNINES (SOUTHERN ITALY): INFERENCES ON SUPPLY PROVENANCE

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ABSTRACT

LA-ICP-MS U-Pb ages were collected on detrital zircons from two samples of sandstones belonging to Bifurto Formation (BF) (Southern Apennines, Italy). These rocks deposed on carbonatic Campano-Lucana platform are considered analogous for stratigraphic position and deposition age (Langhian time) to Numidian Flysh (NF) sandstones deposed in Lagonegro basin, both cropping out along the east area of the Apenninic chain (D'Errico et al., 2014). However BF arenites show a scarce textural maturity (high content of matrix, angular quartz grain presence, poor sorting) respect to FN typical ultramature sandstones, evidencing a certain variability within the "Numidian type" deposits. This study mainly aims to suggest the provenance of quartzose detritus of Bifurto sandstones comparing their detrital zircon ages with those of the NF deposits. The age data collected on the Bifurto sandstones reveal zircon ages ranging from 2551±40 Ma to 425±9 Ma (fifty-seven concordant ages) and overlapping those of the zircons from NF sandstones (3047±13 Ma - 516±19 Ma) (Fornelli et al., 2015). In Bifurto sandstones two zircon ages at 450 and 425Ma are present whereas these ages are missing in typical numidian sandstones. Relevant is the absence of Hercynian and Alpine zircon ages in all analysed quartzose sandstone samples. In addition, the internal pattern zoning (mainly oscillatory zoning evidenced by SEM imaging technique) of the detrital zircons, in both cases, suggest a magmatic origin of the crystals with ages > 516-517 Ma, therefore a basement in which granitoids or meta-granitoids with ancient ages could be invoked for detritus provenance. A comparison of detritic zircon ages of the "Numidian Type" sandstones from Southern Apennines with those found in Numidian sandstones of Spain, Morocco, Algeria and Sicily (Thomas et al., 2010 and references therein) indicates similar provenance of detritus. The obtained data strengthen the interpretation that the entire area of the African Craton, extending from the Atlantic coast to the Hoggar and Tibesti Massifs, where Archean, Palaeoproterozoic and Cadomian-Panafrican rocks, not involved in the Hercynian or Alpine orogenetic cycles, are widely diffused (Gasquet et al., 2004), represented the common source area of the quartzose supply forming the Numidian successions both in the Maghrebian and Apenninic domains. This provenance is also supported by mineralogical and geochemical data on the Numidian mudstones having kaolinite composition (Mongelli, 2004) derived from weathered areas in which lateritic soils widely occurred. Summing up, even if the quartz rich sandstones outcropping in Central-Southern Italy have a younger deposition age (Langhian) with respect to that of Maghrebian Chain (Aquitanian), the signatures of detrital zircon ages are comparable indicating the same provenance area despite a certain delay in the supply of sediments.

GOLD IN ACCZESSORY ZIRCON THE KOZHIM MASSIF URALS

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ABSTRACT

Crystals of zircon are resistant to external impact and is able to store information about the features of the environments of mineral formation. Some of this information is obtained by the study of inclusions in the mineral. Zircon from the granites of the Subpolar Urals can contain different mineral inclusions: biotite, plagioclase, quartz, apatite, chlorite, hornblende, etc. In the study of accessory zircon from Kozhim granite massif (the Subpolar Urals) was first discovered the inclusion of gold. The massif is located on the left and right banks Kozhim in river basins with Osya and Ponyu. Granites of this massif is a medium-grained pink leucocratic rocks with massive texture probablitity. The studied mineral is dark brown translucent short-prismatic crystal with the inclusion of gold and secretions of quartz. Size of the zircon 0.04 mm. Aspect Ratio 1.65. The appearance of the crystal faces is caused by (110), (100), (111). According to articles author, the crystallization of this zircon occurred at the initial stage of formation of the granite massif at a temperature of 700 - 900º? and high alkalinity environment. Studies have shown that the inclusion of gold formed during the growth of zircon. As a result of loss from the melt gold formed hydrosol by increasing the viscosity of silica melts. Hydrosol is part of the complex high-temperature (about 800º?) silicate fluid environments. The massive formations of quartz in formed in these environments. This is confirmed by the presence of segregations of quartz in the studied zircon. In determining the chemical composition of the inclusion of gold, the authors have identified the presence of excess oxygen. It has allowed to assume, that the inclusion of gold is gold with a thin film of the oxide of gold. The formation of such oxide is possible at 500-700°C results from the interaction of oxygen with gold atoms on its surface. This suggests that during the growth of zircon temperature of the mineral-forming environment could be reduced to 700°C and below. In that way, discovered the inclusion of gold and its chemical composition allow us to conclude about the studied crystallisation of accessory zircon at a temperature of 800º? and above at the early magmatic stage of formation of granite of the Kozhim massif and further by reducing temperature up to 700 ° C and below during postmagmatic stage.

The work is executed at financial support of the fundamental research Program of RAS 15-18-5-17.

PLATINUM-GROUP ELEMENTS GEOCHEMISTRY AND PETROGENESIS OF ULTRAMAFIC ROCKS FROM THE RUDAN ULTRAMAFIC COMPLEX, KERMAN PROVINCE, SOUTHERN IRAN

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ABSTRACT

The Rudan ultramafic complex is located in Southern Kerman province and composed mainly of, massive harzburgite, small to medium size lenticular dunite and subordinate very thin olivine websterite dykes. Granular and protogranular are the main textures in dunites and harzburgites, and orthopyroxene, olivine and to a lesser extent clinopyroxene and chromian spinel found in the harzburgites and dunites. The forsterite content of olivine is slightly higher in dunites (Fo92.5) than those in harzburgites (Fo91). Detailed electron microprobe study reveals intermediate Cr# (0.33-0.56), relatively high Mg# (0.59-0.75) and very low TiO2 content (averaging 0.01 wt %) for chromian spinels in Rudan peridotites. The Fe3+# is very low, (<0.09 wt%) in the chromian spinel of peridotites of the Rudan complex which reflects crystallization under low oxygen fugacities. Moreover, the vast majority of the Rudan peridotites are strongly depleted in REE. Total PGEs in peridotites from Rudan complex are very low (average 25 ppb) and are highly depleted in PGE contents relative to chondrites. The PGE spidergrams in dunites are unfractionated, and the PdN/IrN ratios averages 1.02, whereas the harzburgites show slightly positive slopes PGE spidergrams, together with a small positive Ru, Pd and Au anomaly, and their PdN/IrN ratio averages 2.75. Moreover, the PGE chondrite and primitive mantle normalized patterns of harzburgites from Rudan complex are relatively flat which are comparable to the highly depleted mantle peridotites and indicating a high degree of partial melting (about 17-22%) of the mantle source. The mineral chemistry data and the Platinum-group elements geochemistry indicates that the harzburgites of the Rudan ultramafic complex are residual and dunites are replacive and tectonically have been generated in the fore-arc mantle region above a supra-subduction zone setting.

APPLICATION OF CATHODOLUMINESCENCE TO THE STUDY OF FELDSPARS: IMAGING AND SPECTROMETRY

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ABSTRACT

Cathodoluminescence (CL) studies were carried out on polished thin sections of different feldspar samples (from migmatites, granites, aplite-pegmatites and granitic aggregates) using a hot cathode CL equipment HC3-LM coupled to an optical microscope and to a spectrometer (SpectraPro 2300i and a CCD Pixis 400B detector and the software Winspec32) from the Faculty of Sciences of University of Porto. The system was operated at 14kV and a filament current of 0.18 mA. The samples were coated with a thin gold film using a Cressington 108 Auto device. Luminescence images were acquired during the CL analysis with an adapted digital video-camera (KAPPA PS 40C-285 (DX) with dual stage Peltier cooling) and an acquisition time between 351ms and 3,52s. The CL study, including imaging and spectrometry, proved to be an important tool to complement the feldspar petrography as it contributes to the identification of features not observed under optical microscope. The application of the Cathodoluminescence to feldspar allows distinguishing between potassic feldspar and plagioclase, differentiating generations of feldspar and displaying internal zoning and growth areas, among other. The spectrometry complements the CL imaging. It allows obtaining a qualitative level of emission intensity, which permits the interpretation of the nature of this luminescence in each feldspar. Bands shown in the spectra are related to the existing activator elements. In the present study, it was found an association of each feldspar to different spectra and respective colour. The plagioclases exhibit yellow or green luminescence. The activator element is Mn^{2+}, showing a broad emission band between 550 - 570 nm specially detected on this type of feldspars, due to the replacement of K^+ for Mn^{2+}. The potassium feldspars have more or less intense blue colour associated with various activators elements: the activator element is Cu^{2+} showing a broad emission band between 420±5 nm. This emission band can be detected either in potassium feldspar or in plagioclases, but when associated with the blue colour, it indicates that it is a potassium feldspar. Spectra with a wavelength of 460±10 nm, associated to the element activator/synthesizer Ti^{3+}, which is initially deposited as Ti^{4+}, replacing Al, as temperature rise. The emission band with a wavelength of 860 nm correspond to the activator element Pb^+, and occurs specially in potassium feldspar like adularia and ortoclase. The activator element Al - O - Al, show a broad emission band between 450-480 nm. This emission in CL is caused by the replacement of Al^{3+} and Si^{4+} in feldspars.

MINERALOGY AND GEOCHEMISTRY OF THE BA (PB-ZN) VEINS OF THE GHAR ROUBAN AREA, WESTERN ALGERIA

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ABSTRACT

Barite occurrences in Liassic carbonate rocks are widespread in the region around the eastern part of Ghar Rouban.. The barite occurrences were exploited in open pits but also underground. The mineralogy of the deposit is relatively simple. It consists of barite as the main mineral, with calcite, and sphalerite, galena and small amounts of Fe-hydroxides. Microscopic studies indicate that barite mineralization occurs in different shapes: coarse grains or elongated barite crystals of barite mostly occur as vein-filling textures. Calcite, which is the second most common mineral, generally forms intergrowths with barite. Milky or brown calcite occurs as patches that are about 2 cm in width, sometimes in form of N170 tension gashes and in tiny veins hosted by massive Liassic mudstones . Calcite veinlets spread mainly along the fractures in the wall rocks with galena. Galena occurs as N10 veins or in tension gashes with calcite or as fine grains disseminated in barite . Sphalerite is dominantly fine to coarse-grained (0.01-3 mm) with anhedral texture. Pyrite is rare and disseminated in granular sphalerite. Chalcopyrite is disseminated in galena. The supergene alteration is characterized by hematite, covellite, malachite and cerussite. The rare-earth element content of the barite of cover is quite variable.Barites have low total REE contents ranging from 1 ppm to 48 ppm, Fluid inclusion microthermometry indicates that the ores of the veins was formed from the fluids at temperatures between 100C ? and 110 ?C.and high salinity (21% NaCl eqv.)

TYPOMORPHIC FEATURES OF ZIRCONS FROM MEDVEDEV, YUKHTIN AND DZHELTULIN MESOZOIC ALKALI MASSIFS (SOUTHERN YAKUTIA)

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ABSTRACT

The article presents results of studies of typomorphic features of zircons of Medvedev, Yukhtin and Dzheltulin Mesozoic alkali massifs. The studied massifs are located within the Aldan-Stanovoy shield of the North-Asian craton. In the Mesozoic epoch, this area underwent tectono-magmatic activation, which provoked formation of many deposits, including such unique ones as gold-uranium Elkonskoe, gold - Lebedinskoe, Kuranakhskoe, and prospect for discovery of new such deposits within this area is promising enough. Study of typomorphic features of zircons of the Mesozoic alkali rocks, using new methods increasing quality of interpretation of obtained geologic data allows detailed identification of physical-chemical conditions of formation of such large multi-stage structures and their possible metallogenic specialization concerning U and Th. At the present time, morphologic and structural-chemical features of accessory minerals, one of which is zircon, are widely used in order to solve issues of correlation, dissection, identification of formation conditions, possible metallogenic specialization. According to A.A. Krasnobaev and J. Pupin zircon classification, types and morphotypes of zircons were identified: In Medvedev massif - J1, J3, S21, S23, Q3, restite; in Yukhtin massif - S23, A; in Dzheltulin massif - D, S5. The studied zircons from objects under consideration are significantly different in morphologic features, that reflects stages and conditions of formation of alkali rocks of the massifs. Chemical features of zircons composition are studied using Camebax micro microprobe analyzer, 10 oxides are identified, and particular attention was paid to UO2, ThO2. Hf2O - only admixture is typical for crystals of Medvedev massif; UO2, ThO2, Y2O3, HfO2 - for Yukhtin massif; ThO2, CeO2, Y2O3, Yb2O3 - for Dzheltulin massif. It is identified that, significantly lower concentrations of ThO2 occur, when UO2 is increased in zircons. The opposite pattern is identified in zircons, enriched with ThO2. Obtained data on typomorphism of zircons indicate that, the latter reflects formation conditions, specificity of compositions of country igneous rocks and their metallogenic specialization concerning U and Th.

FEATURES OF INNER STRUCTURE OF PLACER GOLD OF THE ANABAR REGION (NORTH-EASTERN SIBERIAN PLATFORM)

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ABSTRACT

Mineral and raw material base of placer and ore gold is based on prognosis evaluation, which allows to define promising areas regarding gold-bearing deposit prospecting. But there are some difficulties in gold primary source predicting and prospecting at the North-east Siberian platform, because the studied area is overlapped by thick cover of the Cenozoic deposits, where traditional methods of gold deposit prospecting are ineffective. In this connection, detailed study of typomorphic features of placer gold is important, because it contains key genetic information, necessary for development of mineralogic criteria of prognosis evaluation of ore gold content [1, 2]. Authors studied mineralogic-geochemical features of placer gold of the Anabar placer area for 15 years, with a view to identify indicators of gold, typical for different formation types of primary sources. This article presents results of these works. In placer regions, where primary sources of gold are not identified, there is need to study typomorphic features of placer gold, because it contains important genetic information, necessary for the development of mineralogical criteria of prognosis evaluation of ore gold content. Inner structures of gold from the Anabar placer region are studied, as one of the diagnostic typomorphic criteria as described in prominent method, developed by N.V. Petrovskaya (1973, 1980). Etching of gold was carried out using reagent: HCl + HNO3 + FeCl3 × 6H2O + CrO3 +thioureat + water. Identified inner structures wer studied in details by means of scanning electron microscope JEOL JSM-6480LV. Two types of gold are identified according to the features of inner structure of placer gold of the Anabar region. First type - medium-high karat fine, well processed gold with significantly changed inner structure. This gold is allochthonous, which was redeposited many times from ancient intermediate reservoirs to younger deposits. Second type - low-medium karat, poorly rounded gold with unchanged inner structure. Poor roundness of gold particles and preservation of their primary inner structures indicate close proximity of primary source.

THE PRELIMINARY RESULTS FROM MULTIDISCIPLINARY STUDY OF GRAPHITE: COMPETENCE CENTRE FOR EFFECTIVE AND ECOLOGICAL MINING OF MINERAL RESOURCES PROJECT, CZECH REPUBLIC

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ABSTRACT

The study has been performed under the project "Competence Centre for Effective and Ecological Mining of Mineral Resources" (CEEMIR) The project CEEMIR started in 2014 and will be finished in 2019. The project is funded by the Technology Agency of the Czech Republic (TA CR) under the leadership of the Technical University of Ostrava. The aim of the project is to study critical raw materials (CRM) of the EU, assess the suitable resources of CRM in the Czech Republic and propose a possible efficient and environment-friendly way of their mining and processing. The main task of the Czech Geological Survey at this project is a collection of the current information on CRM, provision of the knowledge and mineralogical and geochemical characterization of selected mineral deposits and prospective resources. The detailed study was focused on the Czech graphite deposits. All graphite deposits in the Czech Republic belong to the metamorphogenic type. They originated during regional metamorphism of clayey sandy sediments rich in organic matter, which is also indicated by higher concentrations of S, P, V and Sr. The deposits occur in the Bohemian Masiff in the two regions: South Bohemian Moldanubicum, and in the Moravicum and Silesicum. The most important deposits occur in the Moldanubicum, particularly in the so-called Varied Group of Cesky Krumlov. South Bohemian graphitic rocks have a character of graphitic gneisses and carbonates. Deposits in the Moravian-Silesian region occur in an area affected by lower grade metamorphism. The graphite samples from 12 different deposits from South Bohemian Moldanubicum graphite districts and 10 deposits from the Moravian-Silesian region were studied using a multi-element chemical assay by ICPMS, scanning electron microscope and micro Raman Spectroscopy technique. Subsequent petrological, litho-geochemical and mineralogical classifications of studied samples enable to construct the schematic genetic model of the evolution of the graphite mineralization in both regions. The Graphite originates from Moravian-Silesian region shows lower degree of crystallization. The whole region is characterized by higher contents of volatile constituents and less sulphur in graphitic rocks. The multidisciplinary study of Czech graphite will be continuing in the next years.

THE GEOCHEMICAL AND MINERALOGICAL CHARACTERISTIC OF STREET DUST OF PRAGUE, CZECH REPUBLIC

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ABSTRACT

This study presents a part of the European geochemical project (Urban Geochemistry - URGE). The URGE was addressed by the Geochemistry Expert Group of the EuroGeoSurvey association, where all European Geological Surveys participate. The mineralogical and geochemical characterization of road dusts of Prague belongs to an additional study of the URGE project. The results of geochemical mapping, provided by Czech Geological Survey, show a few basic sources of the studied elements on the basis of their surface distribution and their representation in the topsoils of the individual city environments: area and point sources. Point sources are old ecological loads, mainly in the area of Brownfields. On the other hand, fundamental area source of studied elements in Prague topsoils seems to be emissions of solid substances, mainly from stationary source. The result suggest that significant area source of studied elements in the topsoils can be affected by traffic. The highest concentrations of heavy metals in the road dust were identified in the samples from the crossroads and highways. The acquired data show that car traffic is the main source of harmful trace elements in a city agglomeration. A study of the association of contaminant trace elements with the different mineral phases of the street dust can make a significant contribution to understanding their behaviour and distribution in the urban environment. A total of 42 samples of street dust were collected in Prague, Czech Republic, from high traffic density areas in the central part of the city. Studied samples were analyzed for Cu, Zn, Pb, Ni, Cu, and PGE metals. Consequently additional samples for the further detail mineralogical study (optical methods, X-ray analysis, and micro-analysis) were taken from the locations where the high element concentrations were found.

SPATIO-TEMPORAL VARIABILITY OF DISSOLVED METALS IN THE SURFACE WATERS OF AN AGROFORESTRY CATCHMENT WITH LOW LEVELS OF ANTHROPOGENIC ACTIVITY

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ABSTRACT

Evaluation of levels and spatial variations of metals in the surface waters within a catchment are critical to understanding the extent of land-use impact on the river system. The aims of this study were i) to investigate the spatial and temporal variations of five dissolved metal (Al, Fe, Mn, Cu and Zn) in surface waters of a small agroforestry catchment (16 km2) in NW Spain and ii) to establish background levels for these metals in the fluvial waters.. The land uses include mainly forests (65%) and agriculture (pastures: 26%, cultivation: 4%). Stream water samples were collected at four sampling sites distributed along the main course of the Corbeira stream (Galicia, NW Spain) between the headwater and the catchment outlet. The headwater point can be considered as pristine environment with natural metal concentrations in waters because of the absence of any agricultural activity and limited accessibility. Metal concentrations were determined by ICP-MS. The results showed that, in general, metal contents increased from the headwater to the catchment outlet. Metal concentrations were relatively low (Fe > Al > Mn > Zn > Cu), suggesting little influence from agricultural activities in the area. Metals presented mean concentrations below reference values for world-unpolluted rivers except for Fe and Zn.This threshold was exceeds in the 3%, 5%, 29% and 84% of the samples for Al, Mn, Fe and Zn, respectively. Metal concentrations do not exceeded the quality standards of European legislation for water intended for human consumption.

MAIN PROSPECTIVE AND ENVIRONMENTAL RESULTS OF LOW DENSITY GEOCHEMICAL MAPPING IN STREAM SEDIMENTS AND SOILS OF ALAGOAS STATE, BRAZIL

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ABSTRACT

The geochemical survey carried out by the Geological Survey of Brazil-CPRM within the Project Geochemical Mapping of Low Density conducted in the Alagoas State (Brazil) managed to collect 267 samples of bottom sediments from streams, representing drainage basins with areas less than 100 km2. In addition, 45 soil samples were collected, approximately in the central part of the cartography sheet 1:50.000 scale, seeking to sample the type most representative soil on each sheet in the B horizon, spread over an area of 27.767 km2. The samples were brought to dryness at 40°C in the sieved fraction (<80 mesh -0.177 mm), and the chemical analyses for 53 elements was carried out by ICP-EAS/MS after digestion with aqua regia. For each chemical element, toxicological patterns Brazilian law was used or omissions were considered international standards. A significant anomaly of Sr (1,970.8 mg.kg-1) occurs in the region of São Miguel dos Milagres, suggesting celestite associated with gypsum in limestones and shales of the Maceió Formation. Several anomalous Cr points of up to 1,871 mg.kg-1, associated with Ni (214.6 mg.kg-1), Cu (154.7 mg.kg-1) and Fe (5.4%), were recorded in the northeastern portion of the state, especially in Joaquim Gomes, on leucocratic rocks, metalogentetically unfavorable, however, it is suggestive that such anomalies are due to the occurrence of mafic-ultramafic lenticular bodies of reduced surface expression not yet mapped. It is observed 107 Cr points with levels above CONAMA N2 (90 mg.kg-1) pattern, indicative of possible adverse effects on biota. High levels of Rare Earth Elements (La 1,116 mg.kg-1, Ce 1,000 mg.kg-1 and Y 125.5 mg.kg-1), associated with expressive values of U (39.5 mg.kg-1) and Th (440.7 mg.kg-1), were recorded in the municipalities of Tanque D'Arca and Marimbondo, east of Limoeiro de Anadia, where pegmatitic bodies previously mined for gems (marine water, amethyst, tourmaline). This observation opens new perspectives of subsurface mineralizations for semiprecious stones, U and REE minerals. The high values of U (27.1 mg.kg-1 to 39.5 mg.kg-1), above of the threshold (U 5 mg.kg-1) defined by NOOA (2008) as plant insurance, in this central-eastern region of the state, suggest environmental care.

PALEOZOIC MAGMATISM ASSOCIATED WITH SB-AU MINERALIZATIONS IN THE SURROUNDINGS OF PORTO (NORTHERN PORTUGAL)

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ABSTRACT

In the studied area there are evidences of Palaeozoic magmatism along the stratigraphic succession from Cambrian to Carboniferous. Igneous, volcanic and sub-volcanic rocks occur along and around a significant Variscan structure, the Valongo Anticline, an asymmetrical antiform anticline, trending NW-SE, located in Central Iberian Zone in the neighbourhood of Porto (Northern Portugal). Mineralisations of gold-antimony-tin-tungsten-lead-zinc and silver occur in the area and some rocks are enriched in REE. Magmatism related to intrusive diabases dikes and acid and basic volcanic rocks occurs interbedded in Montalto Formation metasediments (conglomerates, quartzites, wakes and slates) of Cambrian age. In the transition Cambrian-Ordovician (Tremadocian?) underlying the Lower Ordovician massive quartzite of Santa Justa Formation (Floian age), volcanic rocks exhibit bimodal composition and occur interbedded in a lithologic association mainly composed of conglomerate and quartzite with minor slate and wake intercalations. The acid volcanism consists of interbedded volcanoclastic rocks of rhyolitic affinities and black and green weathered volcanic rocks in thick layers represent the basic volcanism. To the top of this basal Early Ordovician volcano-sedimentary succession, overlaying massive quartzites, a succession of interbedded quartzites, wackes and slates, enriched in ironstones in the normal limb and bearing prints of volcanic origin occur. Sub-concordant quartz veins (exhalative- origin) interbedded in ironstones were interpreted as volcanic layers recrystallized during the circulation of hydrothermal mineralizing fluids. Some authors mention basic volcanism in the Silurian of the area emphasizing its relation with the mineralization. The presence of igneous rocks in Palaeozoic Carboniferous metasediments around Porto is known since middle of nineteen century. Granodioritic porphyry intrusion occurs interbedded in carboniferous metasediments. Metassedimentary country rocks are surrounded by pre- to post-orogenic Variscan granite with no direct spatial relationship with mineralization but hidden granitic apexes suggest an indirect genetic relationship with Sb-Au veins. Chemical analyses were performed on some of the rocks evidencing their origin. Some of these rocks are related to mineralisations. Earlier the main Variscan Au-Sb metallogenic hydrothermal event, metallic preconcentrations (Au, Sb, Pb) occurred during the Palaeozoic, often related to magmatic events.

GEOLOGICAL, PETROGRAPHIC AND MINERALOGICAL INVESTIGATION OF THE BARITE DEPOSITS IN THE HÜYÜK (KONYA)-SARKIKARAAGAÇ (ISPARTA) REGION, SOUTHERN TURKEY

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ABSTRACT

The study area within the Sultandaglari Massif of the inner Taurus belt includes the sedimentary rock groups whose ages vary from Paleozoic to Cenozoic. The Seydisehir Formation is composed of schist, limestone, calcschist and quartzite aged at Upper Cambrian-Lower Ordovish at the base of the sequence. The limestone-calcschist and sandstone units, which are observed as small-sized lenses and strata, show a random distribution within the schists forming the dominant lithology of the formation. Barit ores, which are observed as irregular lenses in different thicknesses, are located parallel to the stratigraphy and schistosity planes within and/ or within the other units forming the Seydisehir Formation, except for the quartzites. The most important barite deposits in the region are the Koçtepe, Yellice, Kipçak, Kuyucak and Baskoyak deposits extending in the direction of GD-NW. The barite ores are divided into two different groups as massive (primary) and plaser (secondary) types. The main ore mineral of the massive type is barite. The average ore grades in the Yellice, Kuyucak and Baskoyak deposits are 90.32%, 89.01% and 92.00%, respectively. The average grade of the three deposits is 87,1%; and its avarage density is 4,4 gr/cm3. In addition to barite in the Baskoyak and Kuyucak deposits, galena (PbS), pyrite (FeS2), chalcopyrite (CuFeS2) and sphalerite (ZnS) and hematite (Fe2O3), goethite (FeOOH) and limonite (Fe2O3 H2O) from oxidized minerals were observed. According to geochemical analyses, massive ores consist of avarage 0.34% SrSO4, 0.65% Fe2O3, 1,5% CaO, 0,6% MgO and 2,3% SiO2 components. The parts derived from the massive barites as a result of the physical/mechanical decomposition accumulated on the slope skirts to form elüvyal type plaser barites. With exception of the Yellice and Kipçak deposits, alteration zones such as dolomitization, silicification and sideritization are obserwed around the barite deposits in the region. In addition to the geological, mineralogical and geochemical data, alteration types, ore structure and texture properties and paragenesis indicate that the Hüyük-Sarkikaraagaç barite deposits might have been formed by hydrothermal-sedimentary processes.

GEOCHEMICAL FEATURES OF RARE EARTH ELEMENTS IN THE DOLOSTONES OF THE HACIALABAZ FORMATION (LATE JURASSIC) FROM HADIM (KONYA, TURKEY) AREA

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ABSTRACT

Purpose of review is to commentate the source of REE and anomalies (e.g. Ce, Eu, and Y) of the Hacialabaz Formation dolomites. The Taurus Mountains represent the Alpine-Himalayan system in the Eastern Mediterranean, which formed a stable northern margin of Gondwanaland during the Paleozoic to Late Mesozoic. The Hacialabaz Formation dolomites were displayed to be mostly disordered and lesser ordered and non-stoichiometric and Ca-rich, and they are mostly locally developed in the lower sections of the Hacialabaz Formation. The Post Archaean average Australian Sedimentary rocks [PAAS]-normalized REE+Y values of the dolomite sample groups show patterns characterized a clear depletion in all REE species. The total REE content of the dolomite displays a strong positive correlation with SiO2, Al2O3, Fe2O3, Na2O, K2O, TiO2 and P2O5 and negative correlation with MgO and CaO. The total REE content of the dolomite displays a strong positive correlation with Ba and Rb and weakly positive correlation with Sr and Zr. The total rare earth element contents are positively correlated to the Sr and ?18O contents in the Hacialabaz Formation dolomites is denoted to a decrease in the salinity of dolomitizing fluids. Also between Sr and ?18O content with total rare earth element of the Hacialabaz Formation dolomites are observed a weakly positive relationship (Fig. 53,59). On account of, reduced rare earth element, Sr and ?18O contents in our samples is expressed a decrease in the salinity of dolomitizing fluids, i.e. the meteoric freshwater mixing to the basinal brines. Hacialabaz Formation dolomites were formed as early diagenetic at the low temperatures in the mixing-zone near-surface burial environments, and as late diagenetic from basinal brines at the higher temperatures in the shallow to medium burial environment.

HEAVY METALS IN HOLOCENE ESTUARINE SEDIMENTS OF JABOATÃO RIVER, PERNAMBUCO STATE, BRAZIL

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ABSTRACT

Two sub-recent sediments cores were collected from Jaboatão River estuary in order to determine the vertical distribution of metals (As, Cr, Pb, Hg, Ni and Zn) in estuarine sediments and to estimate the degree to which sediments are contaminated. The major elements and particle size were also analyzed. To assess the extent of anthropogenic pollution, the enrichment factor (EF) and toxicological reference values (SQG of USEPA) for river sediments were used. Al-normalized enrichment factors (EF) of metals were calculated based on average upper crust and two regional average values for pre-industrials estuarine sediments. The vertical distribution of fine fraction shows a gradual increase from the bottom to the top, while the Al/Si ratio presents an opposite behavior. Mn and K remain constant throughout the sediment profile. Fe, Mg, Ca and Na did not vary greatly with depth. Cu, Ni, Pb, Hg, Zn, Ca, Na, Mg, Fe, Al, and Ti are associated with the fine size fraction while the As is more related to the coarser fraction. Metal concentrations were highly variable especially for Cr (30-743 mg kg-1). The EF values are typically under 1 for Ni, Zn, Pb, Hg indicating that these metals show no enrichment while other metals such as Cr present severe enrichment in most samples when compared to the upper crust reference values. Thus, the Jaboatão River sediments were contaminated with this metal by anthropogenic sources and the sediments are not of good quality in terms of content of arsenic.

MAJOR OXIDE GEOCHEMISTRY OF THE DOGANKUZU BAUXITE DEPOSITS IN THE SEYDISEHIR AREA (KONYA), SOUTHERN TURKEY

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ABSTRACT

The Dogankuzu bauxite deposit is located in the karstic basins developed in the limestone of the Cenomanian Katrangedigi Formation and unconformably covered by the carbonate rocks of the Senonian-Maastrichtian Dogankuzu Formation. Mineral paragenesis of the bauxite consists of boehmite (62,98%), kaolinite (8,23%), hematite (13,01%), anatase (1,61%), diaspore (0,45%), quartz (3,01%), goethite (1,41%), tridimite (0,66%), calcite (2,98%) associated with minor amounts of rutile (0,40%). The bauxite ore is composed of mainly Al2O3 (57,01 wt.%) Fe2O3 (16,04 wt.%), and SiO2 (9,09 wt.%), associated with small amounts of TiO2 (2,48 wt.%), CaO (0,70 wt.%), and MgO (0,29 wt.%), and negligible contents of Na2O (0,015 wt.%), K2O (0,17 wt.%), P2O5 (0,25 %), MnO (0,003 wt.%) and Cr2O3 (0,008 wt.%). The geochemical data show that the host rock carbonates of the Katrangedigi Formation contain minor amount of terrigenous materials that is evidenced by their low Si, Al, Fe, Mg, Ti, Na, and K abundances. The Katrangedigi limestone normalized Breccia bauxite values show Si,Al, Fe, Na, K, Ti and Cr enriched but CaO and MgO depleted majör oxide patterns. The Al2O3 and Fe2O3 show variable concentrations along the Dogankuzu bauxite profile. While the Fe was aspecially enriched in the oolithic zone, Al predominantly enriched in clayey and, to a lesser extent, in massive bauxite zones. The low SiO2 contents (mean 9,09%) of the Dogankuzu bauxite deposit indicate that the Si was leached outh of the system during the intensive lateritization processes under the weakly alkaline pH condition. The Al contents of the bauxite samples show strong to modarate pozitive correlations with Ti and Fe but moderate to weak negative correlations to Ca, Mn, Mg, Na, K, P and Cr contents, suggesting that Mn, P, Cr as well as alkali and earth alkali elements have been demonstrated significiant mass transfer and depletion with increasing of Al contents. The Ti and Al concentrations show strong positive correlation with each other among the major oxides and their correlation line pass through the Katrangedigi Formation plots, indicating that a closely relationship of the bauxite ores with the argillic phase of the Katrangedigi carbonates, and is consistent with residual enrichment of Ti and Al in the strongly weathered Dogankuzu bauxite profiles.

PETROGENESIS AND AR-AR DATING OF EARLY MIOCENE MECITLI GRANITOID IN EASTERN ANATOLIAN REGION, TURKEY: EVIDENCE FOR LOWER CRUST-MANTLE INTERACTION AND FRACTIONATION FROM MMES TO HOST ROCKS ON THE BASIS OF PETROLOGICAL MODELLING

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ABSTRACT

Mecitli granitoid, located in the northeast of Lake Van granitoid, displays I-type, metalamunious and high-K calk alkaline characteristics. Emplacement of the pluton took place at ~23 Ma (Akitaniyen-Early Miocene) in the basis of Ar-Ar dating results and occurred in Miocene in contrast to known Cretaceous age. While the MMEs of the Mecitli granitoid are classified as monzodiorite, monzonite, gabroic-diorite and diorite, the host rocks have granite, granodiorite and diorite compositions. Ar-Ar dating of the MMEs and host rocks from the Mecitli granitoid yield similar ages and they also have same mineralogy and indistinguishable isotopic compositions as well as similarities in geochemical compositions, all of which imply that MMEs of the Mecitli granitoid are earlier crystallized cumulate of the same magmatic system rather than magma mixing processes. FC, EC-AFC and MELTS modelling results indicate that the host rocks of the Mecitli granitoid must have been derived from fractionation of the MMEs. MORB and primitive mantle normalized pattern and Sr, Nd, Pb isotopic composition as well as trace-REE element compositions of the MME imply that they could have been derived from a mixture between lower crust and lithospheric mantle source that had previously been enriched by a distinct subduction component. The results of melting model using REE systematics suggest that partial melting of neither the mantle nor the lower crustal material could generate the MMEs alone, whereas melts that were derived from mixing of these components (Çökek basalts for mantle; 60%: average lower crust; 40%) might be the source for MMEs. Based on the MORB-normalised incompatible trace element compositions, mixtures between the Çökek basalts (60 %) and lower crust (40%) with partial melting degree of 33% might be responsible for the formation of the MMEs and thereby Mecitli granitoid. Based on the tectonomagmatic history of Eastern Anatolia and together with newly obtained data from the current study, collision initiation between Arabian and Eurasian plates should be took place before/around ~23 Ma (Late Oligocene to Early Miocene).

PETROLOGY AND GEOCHEMISTRY OF QUATERNARY MAFIC VOLCANISM IN THE NORTH OF LAKE VAN, EASTERN TURKEY

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ABSTRACT

Quaternary mafic volcanics in the north of Lake Van erupted not only from eruption center like Girekol miniature shield volcano but also from extensional fractures like those of Yüksektepe and Ormuktepe. K/Ar age determinations show that the mafic lavas erupted from a series of volcanic centers in a period between from 1.08 to 0.36 Ma. Basaltic and hawaiitic lavas contain olivine, plagioclase, augite and titanoaugite crystals, displaying textures from porphyritic to aphyric. Major oxide, trace element and isotopic characteristics of the Quaternary lavas indicate that hawaiitic lavas were the fractionated derivates of a primitive alkali basaltic magma via assimilation and fractional crystallization processes. Results of our AFC and EC-AFC models imply that alkali basaltic lavas assimilated negligible crustal material (~2%) in contrast to the hawaiitic lavas experienced crustal contamination between 3% and 10 %. LIL and LRE elements of the most primitive lavas display enrichments relative to HFS elements on N- MORB-normalized spidergrams while their lead isotopic ratios exhibit trends heading towards the EM2 type mantle, implying the importance of a distinct subduction component in the source. These characteristics of the least evolved basaltic samples indicate that the mantle source region of Quaternary mafic volcanism might be enriched by melts that were derived from subducted sediments with a partial melting degree around 10 % rather than from Altered Oceanic Crust (i.e. AOC) melt and fluids. Results of our petrological models indicate that a metasomatized mantle source (MMS) consisting of a mixture of 93 % mantle melt (MM) and 7 % sediment melt (SM) might have been the source composition of the basaltic melts of the Quaternary mafic volcanism.

PETROLOGY OF THE QUATERNARY BASANITIC ROCKS FROM BITLIS MASSIF

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ABSTRACT

Volcanism within the Eastern Anatolian High Plateau characterized by mainly stratovolcanoes, basaltic lava plateaus and it is dominantly spread at the northern parts of Bitlis Pötürge Massif (BPM). Our study focuses on a small scale Quaternary basaltic system that firstly observed within the BPM. The volcanic rocks of our study are basanitic in composition. They exposed along K-G striking tensional fissures and crosscut the Upper unit of the Bitlis Massif. Initial products of the volcanism are scoria fall deposits. Thick basanitic lava flows overly the pyroclastics and formed columnar structures. The basanites are generally fine-grained with phenocrysts of olivine+clinopyroxene. The groundmass is typically of clinopyroxene, olivine and Ti magnetite and Cr spinel with interstitial nepheline. The olivine phenocrysts are typically euhedral to subhedral with Forsterite contents of Fo73-83. Clinopyroxenes are highly calcic and show modest variations in Wo47-52-En34-42-Fs10-15 and are weakly zoned with mg# 89-87 at cores to 86-84 at rims. Nephelines occur as minor minerals within the networks of other groundmass minerals. Ti rich and Fe-Cr spinels occur as inclusions in olivine and clinopyroxenes as well as within the groundmass. LILE and LREE enrichments over HFSE and HREE suggest similarities with magmas generated from enriched mantle sources. EC-AFC modeling of trace element and isotope compositions indicates that assimilation of crustal lithologies have minor effect on the evolutionary stages of basanitic rocks. Based on LREE/HREE, MREE/HREE ratios and partial melting models, we suggest that basanitic rocks of Çatak are produced from a lower degree melting of a garnet bearing mantle source.

ISOTOPIC GEOCHEMISTRY APPLIED ON SAMPLES OF THE KATHOLIKON OF THE MONASTERY OF TIMIOS PRODROMOS IN THE PREFECTURE OF SERRES, GREECE

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ABSTRACT

The Monastery of Timios Prodromos is the most important Byzantine monument in the prefecture of Serres and one of the most important monastic foundations of Byzantine times in Northern Greece. It was founded in the late 13th century from Ioannikios and then renovated by his nephew, Joachim. The Katholikon dates back to the 14th century, and more specifically between 1300-1333, under the rule of the second founder Joachim. Considering the pathology of Byzantine mural, for the most effective work on removal of over-paintings layer, fixing, restoration, recovery and maintenance of the painted surface and the substrate, it was decided the sampling from exact points of the mural painting representing the different phases, in order to determine their composition, the technology of construction materials, corrosion mechanisms and the proposal for restoration methodology. The methods to be used require very small quantities of material. The measurements are considered almost non-destructive and based on isotopic geochemistry. The techniques used are X-ray diffraction (XRD), scanning electron microscopy (SEM / EDXA) and isotopic analyzes (d18O and d13C) in a mass spectrometer (IRMS). The study of the samples was carried out by scanning electron microscopy with X-ray microanalyzer and analysis of stable isotopes. The study shows that apart from the calcite present in all pigment samples, straw was used as a binder . There is also a mixing of dyes to produce the desired tint while in many cases there are different colour layers. The decay in the mural is extensive, especially in the lower layers of the wall, which have been severely affected by humidity and candle smoke. The creation of gypsum on the surface of the murals is intense and evident in most of the spectra taken.

ASSESSMENT OF THE POTENTIAL AVAILABILITY OF CU AND ZN BY SEQUENTIAL EXTRACTION IN RIVER BED SEDIMENTS OF A RURAL SETTING

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ABSTRACT

Sediments are a reservoir of metals and other elements in the aquatic environment. The analysis of bed sediments is a useful method to study the metal availability in a fluvial system. The main objective of this study is to determine fractions of copper and zinc in the river bed sediments of the upper Mero River (NW Spain), which drains a rural catchment with agroforestry land use, in order to asses copper and zinc potential environmental availability in the study area. Surface sediments were sampled from four sites along the main river course. Sequential extraction is used to fractionate the two metals into six fractions: soluble/exchangeable/specifically adsorbed, bound to manganese oxides, associated with amorphous compounds, bound to organic matter, linked to crystalline iron oxides, and residual fraction. Metal concentrations were determined by ICP-MS. The results showed that copper and zinc were preferentially linked to the residual fraction in all the sampling sites (copper: 78%, 12 mg kg?1; zinc: 69%, 42 mg kg?1, on average), suggesting very low availability of these metals in the study sediments; hence, the possibility to affect the water quality is very low.

THE EFFECT ON THE OIL COMPOSITION IN TWO MAJOR RESERVOIRS (SANDSTONE AND DOLOMITE) BOTH OF INFRACAMBRIAN AGE AND CONTAINED IN THE SAME STRATIGRAPHY COLUMN WITH IMPACT ON THE DEVELOPMENT PLAN OF THE FIELD

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ABSTRACT

In a field of Infracambrian age the reservoirs are in the same stratigraphy column. Two major reservoirs exist one is Dolomite Z and underneath it Lower Sand Y reservoir. The main challenge to characterize these reservoirs comes from the fluid contained in these two different rock types. The oil accumulation in these reservoirs was a product of the first and only pulse of generation from an Infracambrian marine carbonate source rock deposited during anoxic conditions. The generation of this crude was at the beginning of a peak oil window (vitrinate reflectance approx. 0.65%) i.e. immature crude oil. The carbonate Dolomite Z has a thickness of about 300 mts. All the reservoirs in the area have favorable stratigraphic framework to make them potential producers. Lower Sand Y is a channeled facies system of estuarine influenced by tidal effects. On the other hand Dolomite Z is of supratidal and intertidal origin with subaerial exposure with intense dolomitization and the development of secondary recovery porosity systems. The mechanism to provide accommodation for the Infracambrian sediments is a thermal subsidence due to an ancient volcanic activity in the area. The oil in all formations is black, viscous and heavy. The quality of the crude for all formations in the area decreases from base to top. This crude went through a biodegradation process or water wash of light components. The internal structure of Dolomite Z reservoir although apparently homogeneous however has different compartments with different values of porosity, permeability and oil quality. The use of biomarkers as to characterize the crude oil and to determine the compartments division shows to be a powerful tool as to determine the crude type and how the formation is divided and subdivided. Once this is done it will be correlated with the stratigraphy of the area as to confirm the new compartments obtained from the geochemical analysis. This will play an important role in designing the exploitation plan of the area.

SEISMOTECTONIC ANALYSIS OF THE OLEKMA-STANOVOY REGION, SOUTH YAKUTIA ,RUSSIA (PALEOSEISMOGEOLOGICAL ASPECTS)

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ABSTRACT

Geological, tectonical and seismological studies carried out in South Yakutia for more than 50 years revealed seismogenerating structures in the interaction zone of the Eurasian and Amur lithospheric plates. The structures traceable within the Lena-Amur interfluve, between 50° and 60° N, extends eastwestward as a wide (up to 400 km) seismic band over a distance of 3000 km from Lake Baikal, through Transbaikalia, South Yakutia and Priamuria, to the Sea of Okhotsk. The zone of plate interaction is bordered on the north by the Baikal-Stanovoy seismic belt (BSB) extending eastwestward from Lake Baikal along the southern margin of the Siberian platform, through the Stanovoy highlands in Transbaikalia, the Stanovoy Range and the Aldan-Uchur plateau in South Yakutia, to the Sea of Okhotsk. The BSB combines the events of the Baikal rift zone (BRZ) in the west and the Olekma-Stanovoy zone (OSZ) in the east. During nearly the 50-year period of instrumental observations, more than 150 thousand events with M ≥2 were reported from the BRZ and over 40 thousand from the OSZ . The southern boundary of the plate interaction zone is marked by an epicentral cluster extending eastwestward from Northern Mongolia, through East Transbaikalia along the Tukuringra-Soktakhan-Dzhagdy Ranges in Priamuria to the Sea of Okhotsk. Within this boundary, the Tukuringra-Dzhagdy seismic zone (TDZ) is most active. It is located 200 km to the south of the OSZ and, extends parallel to it between 54° and 55° N to the east of 120° E. Some eight thousand seismic events were detected in the zone over the 50-year period. According to the focal mechanism solutions, motions in the earthquake foci within the OSZ and TDZ are of left-lateral strike- slip, thrust and reverse fault nature. The NS-trending Temulyakite-Dzheltula seismic band (almost 3,000 events) crosscuts the study area between 120° and 125° E from the Lena River along the left bank of the Olekma River and its right-side tributary Nyukzha, through the Amur River valley, into the Lesser Khingan Range in China. The band divides the zone of interaction of the Eurasian and Amur lithospheric plates into two blocks – Transbaikalian – from Lake Baikal up to the Olekma River and the Aldan-Stanovoy – from Olekma to the Sea of Okhotsk. The described seismotectonic setting the relationship between the regional faults and the foci of associated strong seismic events, as well as the present-day tectonic stress fields are be studied in detail based on the focal mechanism solutions of earthquakes and geological and structural observation datas, as well as the data on the system of plates and blocks in Pribaikalia, Priamuria and South Yakutia. This work was supported by the grant of the Russian Science Foundation (RSF) N 15-17-20000

PALEOSEISMOGENIC STRUCTURES OF THE SOUTHERN PART OF THE KHENTEI-DAURIA DOME, MONGOLIA

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ABSTRACT

In recent years, the Hustai, Gunji, and Kerulen paleoseismogenic structures have been discovered and examined within the Henteyn uplift. Their investigations revealed zones of probable earthquake foci, presenting a seismic hazard for Ulaanbaatar – capital of Mongolian republic. We report the first data on the quantitative parameters of prehistoric earthquakes in the Meso–Cenozoic Upper Kerulen basin. The absolute age of two paleoevents determined by radiocarbon dating is within 1152–1702 BC and 5466–7201 BC. Seismogeological study of dislocations made it possible to estimate the type of tectonic stress during the formation of structures within the Henteyn uplift and to explain their nature. The horizontal-compression stress is mostly due to endogenous processes, which lead to the enlargement of the uplift area at the expense of the peripheral Mesozoic sedimentary basins. Results of paleoseismic studies evidence the high seismic potential of the zone of active faults located along the axial line of the Khentei-Dauria dome. Magnitudes and ages of several prehistoric earthquakes have been estimated from seismic dislocation parameters. The magnitude values of known paleoearthquakes located within the inner part of the dome are less than those for earthquakes occurred in the outer zone. Seismicity zonation of the dome is closely related to its geological setting and tectonic evolution.

This study was supported by the Russian Scientific Foundation (RNF N 15-17-20000).

MINERALOGICAL AND GEOCHEMICAL PROPERTIES OF CRETACEOUS-TERTIARY AGED DAVUTLAR FORMATION FROM DEVREKANI/KASTAMONU (W - TURKEY): TO INTERPRETE THE ORIGIN AND PROVINCE

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ABSTRACT

This study area is carried out North of Kastamonu region. Devrekani, Seydiler, Agli and Küre are the most important villages in the investigated area. In the study area, Mesozoic aged units unconformably overlay on the Precambrien aged basement rocks (marble, schist, amphibolite, dolomite, granite, gneiss, diorite). Cretaceous-Tertiary aged Davutlar formation is formed by sandy sediments, shallow marine sandy-silty carbonate, marl and conglomerate. In the investigated area, unconformities were determined between Paleozoic and Mesozoic series, but Upper Cretaceous and lower Tertiary epoch is continous. A number of samples were collected from the measured stratigraphical sections at the different locations. Mineralogical analyses were conducted on the samples by XRD methods. In the whole rock, clay, calcite, quartz, feldispar, mica and dolomite are the common minerals. In clay fraction analyses, illite is found as a dominant mineral, the other clay minerals smectite, smectite-chlorite, chlorite, kaolinite and serpantine. Chemical analyses were made on 14 samples. The purpose of this study, to determine the origin and the provenances of the sediments from the global tectonic view. Source-related factors are affected chemical composition and mineralogy. From this reason, tectonic environment studies on sedimentary rocks were made according to the geochemical composition. In this study, Fe2O3+MgO, TiO2, and Al2O3/SiO2, Fe2O3+MgO major elements ratios are used in these diagrams. Study area rocks are found continental arc, active and passive continental margins fields. Geochemical analyses results and mineralogical studies show that, sediments are fed from different sources and therefore are affected by tectonism. It is considered that intensive tectonic activity in the region can cause the change of source area depending on the gradual uplift of basement rocks (ophiolitic, metamorphic and magmatic source).

THE OSTRACOD ASSEMBLAGES OF EARLY-MIDDLE MIOCENE REEFAL CARBONATES DEGIRMENÇAY, NW MERSIN, S TURKEY

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ABSTRACT

The occurrence of reefal carbonates is depending on biological activity and depositional conditions. Therefore, to outcrop of mechanism of a reef development, it is necessary to determine fossil assemblages and some depositional parameters such as sea level oscillations, substratum or clastic input. This study is carried out on the Kaplankaya and the Karaisali formations which are an important reefal carbonate system around the Mediterranean realm. The study region is located around the Degirmençay town in northwest of Mersin Province. Late Cretaceous ophiolite and Late Cretaceous-Palaeocene ophiolitic melange are situated at the base of the investigated area. These units are unconformably overlain by Miocene sediments. The scope of this study is to outcrop of ostracod assemblages of Early-Middle Miocene reefal carbonate system. Six sedimentary sections were measured from these backstepping reefs that were observed in four different levels during the field study. Microfossil contents of the samples gathered during the measuring sections were evaluated within in the context of this study. It is fixed that the levels including mostly ostracods also contain lesser extent planktonic foraminifera at the same time. Results of paleontological tests, 12 genera and 15 species from ostracoda, 4 genera and 4 species from planktonic foraminifera have been determined. Ostracoda species such as Aurila soummamensis Coutella&Yasinsi, A. ducasseae Moyes, Hemicyprideis villandrautensis (Moyes) and planktonic foraminifera species such as Globigerinoides trilobus, Globoquadrina dehiscens and Orbulina universa d'Orbigny indicated that these reefal carbonates were evolved during the Early-Middle Miocene time interval within the diferent levels. The fossil faunas have not shown a great deal of undergoing a change between the different levels.

PALEONTOLOGIC PROPERTIES OF BURDIGALIAN-LANGHIAN SEDIMENTS (KILISECIK FORMATION) OF KAHRAMANMARAS/S TURKEY

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ABSTRACT

Early-Middle Miocene is a period of significant geological events (such as global marine transgression) at the Alpine-Himalayan belt. The Kahramanmaras Basin is located in transition between the Taurides and Arabian Plate, which are important elements of Alp-Himalayan Belt. Eleven planktonic foraminifera species belonging to Dentoglobigerina, Globigerina, Globoquadrina, Globigerinoides, Praeorbulina and Globigerinella genera have been identified by the micropaleontological studies. Planktonic foraminiferal assemblage demonstrate that the Kilisecik Formation is not older than the Burdigalian as suggested by concomitant presence of G. bisphericus and not younger than of Langhian as suggested by last occurrence of Praeorbulina glomerosa. Globigerinoides spp, Praeorbulina glomerasa and Dentoglobigerina altispira that indicate a warm climatic condition in the study area during Early-Middle Miocene (Burdigalian-Langhian) time.

THE OSTRACOD ASSEMBLAGES AND PALAEOENVIRONMENTAL CHARACTERISTICS OF THE SOMA FORMATION (LATE MIOCENE-PLIOCENE), IVRINDI (NW BALIKESIR, TURKEY)

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ABSTRACT

A non-marine ostracods assemblage was defined from Upper Miocene-Pliocene Soma Formation cropping out Ivrindi (NW Balikesir) in the present study. The Soma Formation composed of mainly clayey limestone, marl, tuffite, sandstone and conglomerate in the study area. Fourteen of 22 samples collected from the measured section have ostracod fossils and six species belonging to five genera have been identified in the area. These ostracod species are Cyprideis torosa, Cyprideis pannonica, Heterocypris salina, Heterocypris sp, Ilyocypris sp and Limnocythere sp. In general, species richness, diversity and preservation of the ostracod assemblages were poorly in the whole section. When the mentioned subjects are taken into account, the fossil assemblage was relatively better at the lower levels than at the upper sediments. The brackish water species Cyprideis were found dominantly at the lower level of the section, while Ilyocypris species, which generally survive in rivers mouths and can live in oligohaline environments and also slightly brackish water, was detected at the middle and upper levels of the section. These fossil assemblages suggest that in the study area, the bottom sequences of the Soma Formation was deposited under brackish water environment and changed to limnic condition at the upper levels during late Miocene-Pliocene.

FORAMINIFERAL BIOSTRATIGRAPHY OF THE UPPER CRETACEOUS SEQUENCES IN THE SINOP BASIN, CENTRAL BLACK SEA REGION, TURKEY

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ABSTRACT

Cretaceous sequences in the Sinop Basin, eastern part of Sinop Basin, are investigated with the aim of defining of the benthic and planktonic foraminiferal biozones. The Cretaceous was studied throughout the sequences including Akveren formation. Two stratigraphic sections were measured from the formation. One benthic foraminiferal biozone and one planktonic foraminiferal biozone were described. The benthic foraminiferal biozone is Ammodiscus-Glomospira-Pullenia Assemblages biozone respectively. The benthic foraminiferal assemblages content 27 species belonging to 30 genera, namely Allomorphina, Ammodiscus, Anomalina, Arenobulimina, Astacolus, Bulimina, Cibicides, Dentalina, Gavelinella, Globulina, Glomospira, Guttulina, Gümbelina, Gyroidina, Heterolepa, Lagena, Lenticulina, Nodosaria, Nuttalinella, Oolina, Planorbulina, Planularia, Pullenia, Recurvoides, Reusselle, Robulus, Rzehakina, Spirillina, Tappanina, Turrispirillina. One upper Cretaceous planktonic foraminiferal biozone was distinguished by using 34 species belonging to 16 genera, consisting of Abathomphalus, Archeoglobigerina, Globigerinelloides, Gansserina, Globotruncana, Globotruncanella, Globotruncanita, Guembelitria, Hedbergella, Heterohelix, Pseudoguembelina, Pseudotextularia, Racemiguembelina, Rosita, Rugoglobigerina, Rugotruncana. This biozone is Abathomphalus mayorensis biozone respectively. According to foraminiferal assemblages, the age of the formations is determined as upper Cretaceous.

OSTRACOD CONTENT OF THE EOCENE AGE UNITS IN ORDUZU-PINARBASI (EAST MALATYA) REGION

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ABSTRACT

Eocene aged units locating on Mesozoic old basis in the east of Malatya with angular unconformity, again Neogene old units overlap unconformably. This study was done in Gedik formation consisted of carbonated mudstone, siltstone, sandstone, carbonated pebble stone, nummulites limestone with Suludere Formation formed by Eocene old flysh type sediments that expose in Orduzu and Pinarbasi, three stratigraphic sections were measured from these formations and 65 samples were collected. As a result of micropaleontologic studies done with studied sections, it was obtained that samples contain abundant planktonic, benthic foraminifers however slightly ratio of ostracod. With detailed biostratigraphic studies done with foraminifers, ostracod genus and species such as Bairdia sp., Cytherella triestina, Cytherella sp., Krithe rutoti, Trachyleberidea stricta, Xestoleberis subglobosa, Paracypris sp., Quadracythere vermiculata, Hermanites sp. in these formations given Ipresien-Bartonian (Early-Middle Eocene) age, were defined. Defined ostracod abundance reflects epineritic and infraneritic conditions in Ipresien-Bartonian.

OSTRACOD ASSEMBLAGE OF THE MIOCENE SEQUENCE, N-NW MALATYA BASIN

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ABSTRACT

The study aims to define ostracod assemblage that sediments of Early Miocene aged Akyar Formation involves locating between Yazihan region and Hekimhan of N-NW Malatya Basin in the south side of Toros-Anatolian Platform. In this study, 50 samples consisted of limestone, mudstone, calcirudite and calcarenite units were compiled along two metrical stratigraphic pecked line from Akyar Formation. Besides abundant and well protected planktonic and benthic foraminifers that were obtained in samples in studied sections, it was also obtained that they involve slightly ostracod abundance. As a result of biostratigraphic studies done with detailed planktonic and benthic foraminifers, types belonging to ostracod such as Aurila, Bairdia, Cytherella, Cytheropteron, Henryhowella, Hermanites, Krithe and Pokornyella in Aquitanian-Burdigalian (Early Miocene) aged Akyar Formation were defined and they were obtained to be consistent with other datas.

BIOSTRATIGRAPHY, SEDIMENTOLOGY AND STRATIGRAPHY OF UPPER TRIASSIC CARBONATES OF THE BITLIS MASSIF AND PETROLOGICAL PROPERTIES OF ACCOMPANYING VOLCANIC ROCKS

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ABSTRACT

The Bitlis Massif comprising Late Triassic fosilliferous carbonates and accompanying volcanic rocks stores evidence of the opening of Neotethys Ocean. It forms a part of the Tethyan suture zone that was accumulated during late Mesozoic-Early Cenozoic time. The studied section, mainly characterized by recrystallized limestone, is within the cover sequence of the Massif and located at southeastern parts of the Elazig city. The base of the section starts with volcanic rocks and is followed upwards by limestone alternating with volcanics. The main aims of this study are to construct detailed foraminiferal biostratigraphy and to study in detail sedimentology and stratigraphy of Upper Triassic carbonates of the cover sequences of the Bitlis massif and petrological properties of accompanying volcanic rocks. The Upper Triassic bioata within the succession mainly consists of involutinids, which are strongly recrystallized, nodosarids, trochamminids and ammodiscidids. The most common taxa include Triasina hantkeni, which is a zone marker for the Sevatian-Rhaetian interval, Aulotortus gr. sinuosus, Aulotortus friedli, Aulotortus sp., Auloconus permodiscoides. Based on the foraminiferal taxa, Triasina hantkeni assemblage zone is determined within the studied succession and a Late Norian-Rhaetian age is attributed. Volcanic rocks of the section found at the lower parts of the succession are alkaline meta-basalts and have enriched MORB affinities with lower Mg#. LILE and LREE display enrichments relative to the HFSE and HREE respectively. Partial melting model calculations suggest that basaltic rocks of the section would be produced by melting of garnet bearing mantle sources. It is clear that the results provide important contributions to the geology of the South Eastern and Eastern Anatolian regions and to the evolution of the Neotethys Ocean on a global scale.

THE UPPER MIOCENE REEF COMPLEX OF VIGOLENO (NORTHERN APENNINES, PIACENZA - ITALY)

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ABSTRACT

During the late Miocene, reef complexes characterized by poorly diversified coral associations (mainly Porites, occasionally associated with Tarbellastraea and/or Siderastraea), became widespread in the Mediterranean area. One of these complexes crops out at Vigoleno (Castell'Arquato, Piacenza, Northern Italy). According to regional paleogeographic and palinspastic reconstructions, it can be considered up to now the northernmost latest Miocene (Tortonian-Messinian) reef of the Mediterranean area. Despite the limited outcropping and the faulting, the multidisciplinary investigations reveals the anatomy of this reef complex along two reference sections. In addition a marked cyclicity characterizes both carbonate and siliciclastic deposits of the Vigoleno wedge-top basin. At present the lack of reliable geochronological markers and unsuitability of the material for stable isotope analyses are not sufficient to constrain the time-span and the main controlling environmental factors of these depositional cycles.

STRATIGRAPHY OF UNITS IN THE ALAÇAM (SAMSUN-TURKEY) REGION

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ABSTRACT

The aims of this study are to obtain new data for geology and stratigraphy of Alaçam region and to contribution to previous studies and to exhibits of cover units stratigraphy in the region. The marine cover units aged Cretaceous-Quaternary are separeted from Permo-Triassic basement units clearly. These units will be determine as the geological and stratigraphical and obtain new data. So, these data will be correlate with previous studies carried in the region. In this study, geologic, paleontologic, biostratigraphic features of units in the areae specially cover units were defined. Accordingly, the geologic and stratigraphic position of investigated are a that contain about 200 km^2 area in the Alaçam town and its surrounding (central Pontids) is reviewed. The unit swhich is quite close to each other geographically were called as differentformations, although they have the same stratigraphic level. In this study, detail paleontological and stratigraphical features of units which have same chronostratigraphic level are determined in the region and its surrounding. The litho-biofacies features of these units are collected/investigated to combine under the same lithostratigraphic unit. Interms of these features it has at tempted to distinguish whether they are equivalent to each other.

REALISTIC FEATURES IN ANALYZING THE EFFECT OF THE SEISMIC MOTION UPON LOCALIZED STRUCTURES CONSIDERING ASEISMIC DEVICES INFLUENCE ON THEIR DYNAMIC BEHAVIOR

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ABSTRACT

In studies of seismic risk and hazard it is of utmost importance to assess the effects of the seismic motion upon localized structures, either natural or man-built. Usually, structures are viewed as localized harmonic oscillators, with one or several degrees of freedom and corresponding eigenfrequencies. It is assumed that the seismic motion acts as an external force upon such oscillators and the resonant regime is highlighted. We pursue in examining the necessary criteria, in order to highlight, depending on the specific conditions, the search of an effective solution to reduce seismic loads on the structures. It is shown that the reaction of the oscillator modifies its inertia, which in turn leads to a change in the oscillator's eigenfrequency; this change is controlled by the coupling function. The present treatment opens the way of introducing new, more realistic features in analyzing the effect of the seismic motion upon localized structures, in particular the non-linear features of the coupling of the structure with its local site's motion. The vulnerability of a structure to strong earthquakes can be appreciated by comparing its fundamental period with the fundamental period of soil deposit. Under high stresses the rocks became nonlinear dependent of their dynamic characteristics. This behavior imposes a new assessment for period-shift due to nonlinearity. The dispersion of the natural periods with respect to the loading is an important factor. Also, the period-shift from a fixed-base to an isolated base of the same structure depends on the nonlinear characteristics of the isolator and site layers. One of these solutions, conventionally named "base isolation", resorts to place at the bottom of buildings special components, leading to long fundamental periods that would avoid the tendency of resonance of buildings with its site in the case of strong earthquakes. According to this technology the particular mechanical characteristics of the isolator layer allow to approximate the isolated structure as two-degree of freedom system. But within this model can be demonstrated that first fundamental frequency of the isolated structure is very close to the frequency of a model with one degree of freedom consisting of structural mass mounted on a flexible insulating layer, thus transferring deformable processes to the insulating layer. Analysis of the effects of earthquakes highlighted the behavior of different structures depending on their rigidity. But only this criterion could not justify effects which some seismic shocks affected more rigid structures and others the flexible ones. Furthermore, structures with the same stiffness but located on different sites were affected differently. By neglecting this period-shift dispersion of the base isolation technology – the drawing out from dangerous resonant zone - can be compromised. So the linear shift estimation must be corrected due to the nonlinear characteristics of the isolator layer and site materials.

BRIEF OVERVIEW OF USING NONLINEAR SEISMOLOGY IN ANALYSIS OF THE SOIL DEPOSITS EFFECTS ON STRUCTURE LOCATION

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ABSTRACT

Taking into account of nonlinear seismology in the process of structure location evaluation, for future constructions, or in the process of rehabilitation, in regions with strong earthquakes, like Romania, could lead to a safer construction environment. In the first phase, the seismic hazard of the region, we analyze the seismic input from the soil deposit to the foundation. We do this considering the nonlinear behavior of soil strata function of strain induced by strong earthquakes, with magnitude MW > 6. Usually are considered the following soil parameters: torsional (shear) modulus and damping of the soil deposit. This approach is very important for the stability of future buildings in seismic environment because torsional modulus decreases and damping increases with as much as 50% from the initial “in situ” values. We shall present also some laboratory tests for these dynamic nonlinear parameters with resonant columns. Some considerations for location analysis, considering: geotechnical, geophysical, seismic and local conditions will be reviewed. In connection with the above parameters will be presented also the “spectra amplification factor” in connection to Vrancea zone (most seismic region of Romania with 4 strong earthquake in the last century, the one from 1977, MW= 7.4 , ~ 1400 victims) parameter which makes the connection between seismic hazard, local seismic effects and nonlinear behavior of soils. About the vulnerability of structures, influenced by the parameters of location effect, will be presented some aspects about the connection between the period of the structure and of the soil deposit where lays its foundation and how considering soil structure interaction could make safer buildings (especially in the case of that of great importance). In many locations in Romania, including the capital Bucharest and other densely populated cities, studies of structure location were possible because of the fast development of the “National Seismic Network” of the National Institute of C-D for Earth Physics, composed of six sub networks which provided the researchers with the necessary data for analyzing seismic input. Through this study we understand analyzing the seismic hazard of structure location, how is influenced by the parameters of nonlinear seismology and through its consideration we believe to mitigate seismic risk in earthquake regions.

TAIWAN MOUNTAIN SEISMIC NETWORK AND ITS PRELIMINARY IMPLICATIONS IN EARTHQUAKE SOURCE STUDY

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ABSTRACT

With 80 km wide from east to west and 340 km long from south to north, the Taiwan mountain area covers an area of 2/3 of the entire Taiwan Island. This area has an average height of 2500 meters which is the region that very difficult to collect earthquake records. In order to obtain the free-field ground motions generated by earthquakes, the Institute of Earth Sciences of Academia Sinica began to deploy the Taiwan Mountain Seismic Network (MTN). This installation of MTN started in 2006 with 16 stations and increased to 80 stations in 2013. Subsequently, 30 stations have selected to upgrade their old instruments to modern Titan accelerometers (Nanometrics) since 2014. During the past few years, many moderate earthquakes happen in the mountain area (e.g., the ML 6.4 Jiashian earthquake of 2010, the ML 6.3 Wutai earthquake of 2012, the March ML 6.2 and June ML 6.5 Nantou earthquakes of 2013, the ML 6.6 Meinong earthquake of 2016), these earthquakes produced many near-source ground-motion records. This provides us an opportunity to estimate seismic source parameters (i.e. source dimension, stress drop and seismic moment) of earthquakes based on S-waves source spectra by applying Brune's model (1970) through the spectrum-fitting technique. Our goal is to understand the seismic source characteristics for moderate earthquakes in the Taiwan mountain area.

ON-LINE DATA TRANSMISSION, AS PART OF THE SEISMIC EVALUATION PROCESS IN THE BUILDINGS FIELD

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ABSTRACT

The thorough analytical modeling of seismic actions, of the structural system and of the foundation soil is essential for a proper dynamic analysis of a building. However, the validation of the used models should be made, whenever possible, with reference to results obtained from experimental investigations, building instrumentation and monitoring of vibrations generated by various seismic or non-seismic sources. In Romania, the permanent seismic instrumentation/monitoring of buildings is part of a special follow-up activity, performed in accordance with the P130/1999 code for the time monitoring of building behavior and with the seismic design code, P100-2013. By using the state-of-the-art modern equipment (GeoSIG and Kinemetrics digital accelerographs) in the seismic network of the National Institute for Research and Development URBAN-INCERC, the instrumented buildings can be monitored remotely, with recorded data being sent to authorities or to research institutes in the field by a real-time data transmission system. The obtained records are processed, computing the Fourier amplitude spectra and the response spectra, and the modal parameters of buildings are determined. The National Seismic Network of "URBAN-INCERC" includes 57 seismic stations (for monitoring ambiental vibrations originating from seismic and non-seismic sources), of which 32 seismic stations are connected to an on-line real-time data transmission system. The paper presents some of the most important results of the institute in the field of building monitoring, focusing on the situation of some significant instrumented buildings located in different parts of the country. In addition, maps with data received from seismic stations after the occurrence of two recent Vrancea (Romania) earthquakes, showing the spatial distribution of ground accelerations, are presented, together with a comparative analysis, performed with reference to previous studies in the literature.

STRUCTURAL ARCHITECTURE OF THE NORTHERN EDGE OF THE KHEMIS MILIANA BASIN FROM GRAVIMETRIC DATA (NORTHWEST OF ALGERIA)

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ABSTRACT

Located in the northern Algeria part, between two important seismogenic basins (Chlef and Mitidja basin), the Khemis Miliana plain represents an important key to understand the connection between these two seismogenic basins. This Neogenic plain is known as a vast depression covered by alluvial quaternary deposits. It corresponds to an elongated east-west structure of about 80 km long and ~35 km wide, bounded on the north by the Dahra Zaccar Mountains and the Ouarsenis massif in the south. A new geophysical investigation was carried in the northern part of the Khemis Miliana plain. This study is based on gravity data collected during 2016, which included a total of 500 gravity measurements, spaced by about 1 km, covering an area of ~500 km². In this work, we present different gravimetric maps (Bouguer anomaly, residuals, horizontal and vertical gradients, upward continuation, Euler Deconvolution,...). The most important one is the Bouguer anomaly map which represents the basic document in the gravimetric prospecting. To better constrain our results we used the magnetic data (provided by aero-service, 1970). The objective of this study is to specify the nature, the organization and the structure of the geological sets that constitute the Khemis Miliana plain and its edges in order to understand the connection between the Chlef and Mitidja basin.

COMPARISON OF THE SOIL DYNAMIC AMPLIFICATION FACTOR AND SOIL AMPLIFICATION BY USING MICROTREMOR AND MASW METHODS RESPECTIVELY

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ABSTRACT

Single Station Microtremor method, which is widely used nowadays, is an effective and easy applicable method. In this study, dynamic amplification factor distributions of the study area were obtained using scenario earthquake parameters with single station microtremor data gathered at 112 points. Also a surface wave active method which is known as MASW (Multichannel Analyses of Surface Waves) were applied at 43 profiles to calculate the soil amplification values. Dynamic amplification factor (DAF), soil amplification, the predominant soil period (PSP), geology and topography data of the study area are analysed together. It has been observed about sea level parts of the study area which are generally composed of alluvial units have 2 or higher dynamic amplification factor and soil amplification values. Additionally, in high altitude regions which are composed of volcanic rocks, relatively lower dynamic amplification factor and soil amplification values are obtained. The minimum amplification value in the study area is 1.15, while the maximum magnification value is 3.05 according to the dynamic amplification results and the soil amplification values are changing between 1.16-3.85 values in harmony. It is seen that the obtained DAF values and the soil amplification values calculated from the seismic velocities are very similar to each other numerically and regionally. As a result of this, it is concluded that the values of the soil amplification obtained by the MASW method and the calculated DAF values in this study are in harmony with each other. Although the depths of research in these two calculation methods are different from each other, the similarity of the results allows us to arrive at the result of how effective the ground layer is on the amplification. It has great importance to calculate the amplification values and other dynamic parameters by in situ measurements for a planned plot because geological units can vary even at very short distances in heterogeneously distributed areas.

CRUSTAL STRUCTURE IN THE WESTERN PART OF ROMANIA FROM LOCAL SEISMIC TOMOGRAPHY

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ABSTRACT

The inner part of the Carpathians in Romania belongs to the Carpathians-Pannonian system bordered by the Eastern Carpathians to the north and east, Southern Carpathians to the south and Pannonian Basin to the west. It is a complex tectonic region with differential folding mechanisms, post-collisional kinematics, rheology and thermal properties, including within its area the Apuseni Mountains and the Transylvanian Basin. The purpose of this study is to map the 3-D structure of the crust over this region on the basis of local earthquake data. Input data were recorded during the South Carpathian Project (2009-2011), a successful collaboration between the Institute of Geophysics and Tectonics of the University of Leeds and the National Institute for Earth Physics (NIEP), Romania. A temporary array of 32 broadband seismic stations (10 CMG-40T, 8 CMG-3T and 14 CMG-6TD) was installed across the western part of Romania (spaced at 40 to 50 km intervals) during the project. In addition, 25 stations deployed in the eastern Hungary and Serbia were considered. P- and S-wave arrivals are identified for all the selected events (minimum 7 phases per event with reasonable signal/noise ratio). All the events are first relocated using Joint Hypocentre Determination (JHD) technique. Then the well-located events were inverted to determine the crustal structure using LOTOS algorithm. The lateral variations of the crustal properties as resulted from the tomography image are interpreted in correlation with the station corrections estimated by JHD algorithm and with the post-collisional evolution of the Carpathians-Pannonian system.

PRELIMINARY ESTIMATION OF KAPPA (?) IN CROATIA

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ABSTRACT

Ground motion at the site is influenced by source, propagation path, and local site conditions, and is described using acceleration Fourier Amplitude Spectrum of shear waves. Spectral parameter kappa kappa is used to describe spectral amplitude decay "crash syndrome" at high frequencies. Over the last three decades, the literature is consistent that near site attenuation kappa or site kappa is affected primarily by site conditions, and source and path terms are regionally dependent. The purpose of this research is to estimate spectral parameter kappa for the first time in Croatia from small and moderate earthquakes. Recordings of local earthquakes with magnitudes higher than 3, epicentral distances less than 150 km, and focal depths less than 30km from several seismological stations in Croatia are used. Spectral parameter kappa was estimated from the acceleration amplitude spectrum of shear waves from the slope of the high-frequency part where the spectrum start to decay rapidly to a noise floor. Using linear formulation of kappa to be a function of a site and distance, standard linear regression of kappa-distance dependence was used. Site kappa was determined from the extrapolation of the regression line to a zero distance. The preliminary results of site kappa from several seismological stations across Croatia are promising. In this research, given site kappa results are compared with local site condition parameters for each station, e.g. shear wave velocity in the upper 30 m from geophysical measurements and with existing global shear wave velocity - site kappa values, site resonant frequency and site amplification estimated from Horizontal-to-Vertical-Spectral-Ratio from ambient noise measurements. These results are significant for a couple of reasons: to extend the knowledge of the attenuation of near-surface crust layers of the Dinarides and to provide additional information on the local earthquake parameters for updating seismic hazard maps of studied area. Site kappa can be used in the re-creation, and re-calibration of attenuation of peak horizontal and/or vertical acceleration in the Dinarides area since information on the local site conditions were not included in the previous studies.

COMPUTING A LARGE REFINED CATALOG OF FOCAL MECHANISMS FOR VRANCEA (ROMANIA) ZONE- 2005-2017

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ABSTRACT

The main objective of this study is to analyze the fault plane solutions of earthquakes recorded in Vrancea zone, intermediate depths, during 2005-2017, a period in which the data provided by the National Seismic Network have reached a high level of quality and quantity. The Vrancea area, is known as a zone with intense and persistent crustal and intermediate seismic activity. The intermediate depth seismicity is the most important seismic area of Romania and is concentrated in a high-velocity volume, an almost vertical body in fact a sinking lithosphere not completely detached, in the depth range from about 60 to 200 km. The epicentral zone is situated in an area of about 40 × 84 km2. The present tectonic of the Vrancea area is a result of a former subduction of oceanic lithosphere, followed by a continental collision and slab roll back or a delamination Using the method developed by Snoke et al 1984 - FOCMEC code, implemented in SEISAN software (Havskov and Ottemoller, 1999), we obtained more than 300 focal mechanisms for intermediate depth earthquakes that occurred in the Vrancea region from 2005 to 2017, with magnitude between 3.5? ML?5.5 and analyze the statistical features of the whole catalog. The dominant style of faulting for Vrancea intermediate depth earthquakes presents a major reverse faulting, mechanism which indicates a predominant compressional stress field, with two main earthquakes categories: first one with the nodal planes oriented NE-SW parallel with the Carpathian Arc and the second one with the nodal planes oriented NW-SE perpendicular on the Carpathian Arc.

MAXIMUM FIRING TEMPERATURES OF ARCHAEOLOGICAL BURNT CLAY REMAINS DETERMINED BY MAGNETIC SUSCEPTIBILITY MEASUREMENTS: AN INTERDISCIPLINARY INVESTIGATION IN THE FIELDS OF GEOPHYSICS AND ARCHAEOLOGY

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ABSTRACT

Palaeo- and archaeomagnetism are powerful tools for recovering the geomagnetic field characteristics during the geological and archaeological past. As an interdisciplinary technique archaeomagnetic analysis demonstrates also the capabilities of the geophysical methods for studying and preservation of our material cultural heritage. Since the materials made of baked clay (ceramics, ovens, etc.) are usually among the most abundant and sustainable finds at each archaeological site they provide valuable information about the development of the society that produced them. Absolute dating is not the only information that is provided by the archaeomagnetic analysis. Using the magnetic properties of the baked clay it is possible to obtain more knowledge about the technological aspects of the pottery production and even to perform provenance studies of ceramic collections. One of the utmost important applications of the magnetic characteristics measurements is the possibility to determine the maximum firing temperatures of the baked or burnt clay materials. By measuring the mass specific magnetic susceptibility and the frequency dependent magnetic susceptibility after stepwise laboratory heating the maximum firing temperatures of a total of 70 burnt clay specimens are determined. Majority of the samples (58) represent burned clay plasters from five archaeological sites in South-Western Bulgaria dated from the Early Neolithic to the late Bronze Age (6000-1500 BC) and one site in South-Eastern Bulgaria from the Early Bronze Age (2500 BC). The common for all these sites is a large-scale burning at the end of the prehistoric settlements. The rest of the samples include materials from household ovens found in South-Eastern (Late Neolithic, 5th millennium BC) and Central South Bulgaria (Late Iron Age, 5th century BC). The obtained data show that the highest firing temperatures are characteristic for the burned plasters. They often exceed 1000°C and vary in a wide range - from 640°C to 1140°C. At the same time, the maximum temperature values for the later (Bronze Age) settlements vary in a relatively narrower range up to 920°C. For the household ovens specimens significantly lower maximum firing temperatures are obtained and, moreover, variations in each separate structure are negligible. This result is more or less expected and fully supports the archaeological evidences of the ovens' purpose (mainly for cooking). The obtained temperature values for all of the studied plasters are significantly higher than the temperatures reached during accidental forest and steppe fires. This conclusion entirely confirms the archaeologists' assumption that the prehistoric settlements were most probably intentionally burned in the antiquity.

MOMENT MAGNITUDE ESTIMATION FOR VRANCEA INTERMEDIATE DEPTH EARTHQUAKES- A COMPARISON WITH EEWS

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ABSTRACT

The seismicity of Romania is significantly affected by earthquakes produced by the Vrancea seismic source with intermediate depth events (3 shocks/century with magnitude Mw greater than 7.0). The seismic activity on the Romanian territory consists of both shallow and intermediate-depth earthquakes. The crustal seismicity is moderate and more scattered in comparison with the intermediate-depth one. The recent upgrade of the seismic network in Romania with high dynamic range accelerometers (114 real time seismic stations equipped with episensors) allows recording of moderate to large magnitude earthquakes at very close epicentral distances (less than 10-20 km). Strong motion data of high quality are also of help in increasing the effective preparation against seismic disasters, and the response during seismic emergencies. The consequent increased ability of a community to quickly recover from the damages of an earthquake thus contributes to lower the seismic risk, usually measured in term of casualties and economic losses. During 2016 in this seismic area were recorded two moderate events with 5.7 magnitude in September respectively December. The purpose of this work consists mainly in the estimation of moment magnitude Mw using the strong motion network of the NIEP. The results are obtained by using the strong motion network of Romania, and also will be compared with the results provided by the Earthquake Early Warning System of NIEP, and also with the moment tensors solutions from other stientific agencies in the world. A stable and automatic method was developed by Gallo et al.,2014, has been implemented in the real time data acquisition and processing system (ANTELOPE) to estimate in real time the seismic moment, the moment magnitude and the corner frequency of events recorded by accelerometers, using Andrews (1986) method applied to S waves. The main goals are the independent estimation of seismic moment and the common characterization for all events recorded by the strong motion network.

NEAR REAL TIME DETERMINATION OF FOCAL MECHANISM AND SOURCE DIRECTIVITY FOR SHALLOW EVENTS IN ROMANIA

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ABSTRACT

The focal mechanism and rupture source directivity for shallow events occurred in Romania are determined by waveform inversion of near-source seismic recordings using FMNEAR algorithm (Delouis, 2014). Both velocity and acceleration recordings can be used. The algorithm allows using finite source models and varying focal depth. In a first step, we determined the following parameters: the moment magnitude (Mw), the double couple focal mechanism (strike, dip, rake) and the distribution of seismic moment along fault strike. In this way, first order estimates of rupture length and directivity are provided. However, for small to moderate earthquakes with Mw < 5.5 the source is simplified to a single point source. A specific band-pass filter is automatically adapted for each individual component of the seismograms (Z, N, E). For finite sources we adopt a linear source model, represented by point sources aligned along strike, each point source being characterized by a local source time function. The inversion is carried out in successive steps combining fast grid searches on the (strike, dip, rake) parameters and simulated annealing to determine rupture onset times and the shape of the local source time functions. The non-linear grid search offers the possibility of assessing the degree of uniqueness of the solution and a confidence index is defined. The method was tested on seismic events with magnitude higher than Mw = 3 recorded by the Romanian seismic network (broadband stations and accelerometers) between January 2008 and December 2016. Tests were made on events recorded by a large number of well-distributed stations, as well as on less favorable cases in order to evaluate the capability of the algorithm to constrain focal mechanism and source time function. At present the FMNEAR method is implemented in near real-time at the National Institute for Earth Physics (Romania).

SITE-SPECIFIC CHARACTERIZATION OF SELECTED RSN STATIONS IN EASTERN ROMANIA

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ABSTRACT

The National Institute for Earth Physics (NIEP) operates one of the largest seismic networks in Europe, the Romanian Seismic Network (RSN). Designed mainly to monitor the crustal and subcrustal seismic activity in Romania, RSN consists of 122 seismic stations, of which 70 have broadband velocity sensors and 42 short period sensors collocated with accelerometers sensors, while ten stations have only accelerometers. All the stations record continuously the ground motion and the data are transmitted in real-time to the Romanian National Data Center (RoNDC), in Magurele, where they are processed and archived. Last year, NIEP has started a national project that aims to a multidisciplinary site characterization of the RSN stations. In this work we present the geological, seismological and geophysical characterization of 7 sites of the RSN located in the Eastern part of Romania. The site characterization was performed by i) collecting all the geological available data ii) performing noise investigations and analyses in order to characterize the noise level at the sites and estimate their resonances iii) estimating the site amplification from moderate (Mw > 4.0) local earthquakes data and iv) determining the surface velocity structure at seismic stations from active data that were holistically inverted by considering the vertical/radial components of Rayleigh waves and transversal component of Love waves, jointly with the radial-to-vertical spectral ratio.

REPEATED EARTHQUAKES IN THE VRANCEA SUBCRUSTAL SOURCE AND INTERCORRELATIONS

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ABSTRACT

The Vrancea seismic nest, located at the South-Eastern Carpathians Arc bend, in Romania, is a well-confined cluster of seismicity at intermediate depth (60 - 180 km). During the last 100 years four major shocks were recorded in the lithosphere body descending almost vertically beneath the Vrancea region: 10 November 1940 (Mw 7.7, depth 150 km), 4 March 1977 (Mw 7.4, depth 94 km), 30 August 1986 (Mw 7.1, depth 131 km) and a double shock on 30 and 31 May 1990 (Mw 6.9, depth 91 km and Mw 6.4, depth 87 km, respectively). The probability of repeated earthquakes in the Vrancea seismogenic volume is relatively large taking into account the high density of foci. The purpose of the present paper is to investigate source parameters and clustering properties for the repetitive earthquakes (located close each other) recorded in the Vrancea seismogenic subcrustal region. To this aim, we selected a set of earthquakes as templates for different co-located groups of events covering the entire depth range of active seismicity. For the identified clusters of repetitive earthquakes, we applied spectral ratios technique and empirical Green's function deconvolution, in order to constrain as much as possible source parameters. Seismicity patterns of repeated earthquakes in space, time and size are investigated in order to detect potential interconnections with larger events. Specific scaling properties are analyzed as well. The present analysis represents a first attempt to provide a strategy for detecting and monitoring possible interconnections between different nodes of seismic activity and their role in modelling tectonic processes responsible for generating the major earthquakes in the Vrancea subcrustal seismogenic source.

CRUSTAL MODELS ASSESSMENT IN WESTERN PART OF ROMANIA EMPLOYING ACTIVE SEISMIC AND SEISMOLOGIC METHODS

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ABSTRACT

In the years 1999 - 2001 two regional seismic refraction lines were performed within a close cooperation with German partners from University of Karlsruhe. One of these lines is Vrancea 2001, with 420 km in length, almost half of them recorded in Transylvanian Basin. The structure of the crust along the seismic line revealed a very complicated crustal structure beginning with Eastern Carpathians and continuing in the Transylvanian Basin until Media?. As a result of the development in the last ten years of the national seismic network (NIEP) some 100 permanent broadband stations are now continuously operating in Romania. Complementary to this national dataset, maintained and developed in the National Institute for Earth Physics, new data emerged from the temporary seismology networks established during the joint projects with European partners in the last decades. The data gathered so far is valuable data both for seismology purposes and crustal structure studies, especially for the western part of the country, where these kind of data were sparse until now. In the years 2009 - 2011 a new reference model for the earth's crust and mantle of the European Plate was defined through the NERIES project from existing data and models. The database gathered from different kind of measurements in Transylvanian Basin and eastern Pannonian Basin were included in this NERIES model and an improved and upgraded model of the Earth crust emerged for western part of Romania. Although the dataset has its origins in several periods over the last 50 years, the results are homogeneous and they improve and strengthen our image about the depth of the principal boundaries in the crust. Two maps of the principal boundaries in the crust are constructed, one for mid-crustal boundary and one for Moho. They were build considering all the punctual information available from different sources in active seismic and seismology which are introduced in the general maps from the NERIES project for Romania. The depths maps in the study region are presented with all their regional peculiarities as they appear, projected on the local tectonic structure for the area under examination.

A PROBABILISTIC SEISMIC HAZARD ANALYSIS FOR EAST ANATOLIAN REGION, TURKEY

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ABSTRACT

The neotectonic regime of Turkey is mainly controlled by the continuing convergence of the African, Arabian and Eurasian plates, which began in the middle Miocene, and results in the westward migration of the Anatolian plate. The ongoing westward movement of the Anatolian plate is accommodated along the right lateral North Anatolian Fault Zone (NAFZ) in the north and the conjugate left-lateral the East Anatolian Fault Zone (EAFZ) in the southeast. Forming a triple junction, the two fault zones join in a complex depression, called the Karliova basin. The study area includes NAFZ, EAFZ and North East Fault Zones. This paper summarizes the probabilistic seismic hazard analysis (PSHA) which was performed for the East Anatolian region and introduces seismic hazard maps produced by considering earthquakes Mw?4.0 occurred during between 1900 and 2017. The East Anatolian region is divided into eight different source zones based on their tectonic and seismotectonic regimes. We calculated the b value, which is the slope of the frequency-magnitude Gutenberg-Richter relationship, from the maximum likelihood method (ML). In this study, PSHA methodology based on Cornell (1968) is applied to the East Anatolian region and PGA values for 10 percent probability of exceedance in 50-years at rock sites are determined by using the attenuation relationships proposed by Boore et al. (2014), and Idriss (2008). Finally, PGA zonation maps are created for the study area by the ArcMap software prepared on the basis of Geographic Information System. Peak ground acceleration values at rock sites are estimated range from 0.1 to 0.4 g for the study area. The highest values are around Erzincan and Bingol cities covered Karliova triple junction. The lowest values are around Black Sea coast.

LOCAL DEFORMATION PRECURSORES OF LARGE EARTHQUAKES DERIVED FROM GNSS OBSERVATION DATA

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ABSTRACT

Researches of deformation earthquake precursors were of an immediate interest from the middle to the end of the previous century. The repeated conventional geodetic measurements such as precise leveling and linear-angular networks have been used for the study. Many examples of studies referenced to strong seismic events using conventional geodetic techniques are presented in (Rikitake T., 1976). One of the first case studies of geodetic earthquake precursors was done. Rare repetitions, insufficient densities and locations of control geodetic networks made difficult predicting future places and times of earthquakes occurring. Intensive development of Global Navigation Satellite Systems (GNSS) during the latest decades allows doing the research in a more effective level. The results of GNSS observations in areas of three large earthquakes (Napa M6.1 earthquake, USA, 2014; El Mayor-Cucapah M7.2 earthquake, USA, 2010; and Parkfiled M6.0 earthquake, USA, 2004) are analyzed in the paper. The characteristics of land surface deformation before, during and after earthquakes have been obtained. The results prove the presence of anomalous deformations near their epicenters. The temporal character of dilatation and shear strain changes shows existence of spatial heterogeneity of deformation of the Earth's surface from months to years before the main shock close and on some distance from it. Revealed heterogeneities can be considered as deformation precursors of strong earthquakes. According to historical data and proper researches values of critical deformations which are offered to be used for seismic danger scale creation on the basis of continuous GNSS observations are received in a reference to mentioned large earthquakes. It is shown that the approach has restrictions owing to uncertainty of the moment of the beginning of deformation accumulation, and also the place of expectation of another seismic event. Verifying and justification of the received conclusions is supposed.

INTENSITY REEVALUATION AND LOSS ESTIMATION FOR THE OCTOBER 26, 1802, NOVEMBER 26, 1829 AND JANUARY 23, 1838 VRANCEA EARTHQUAKES

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ABSTRACT

The Vrancea zone is the most active source in Romania, and generates one of the highest level of seismic hazard in Europe. Vrancea is located at the bending area of the South-Eastern Carpathians, and is characterized by a concentrated seismicity at intermediate depths (60-200 km). Earthquakes can reach magnitudes up to 7.9 Mw and have severe damaging effects, as past events that we reevaluate and project in nowaday times show. The purpose of this paper is first to present reinterpreted macroseismic maps of the effects of the most representative earthquakes from 19th century (October 26, 1802 - Mw=7.9), November 26, 1829 - Mw=7.3 and January 23, 1838 - Mw=7.5). For the macroseismic data we used the Medvedev-Sponheuer-Karnik (MSK-64) intensity scale. The earthquake of October 26, 1802 is assumed to be the biggest event that occurred in Vrancea area according to the ROMPLUS Earthquake Catalog. Our analysis validates this result. Damaging effects for these earthquakes were reported over a wide area, extending beyond Romania, in Bulgaria, Republic of Moldova, Russia, Turkey and Ukraine. Based on intensity parameters and attenuation models specific to the Vrancea zone, we check the damage distribution estimated for nowaday times and its match with the distribution highlighted by the reevaluated intensity maps. For seismic loss estimation we use the ELER and SELENA software (both empirical and analytical methods for buildings loss estimation). Results, in terms of estimated number of affected buildings and casualties, are compared with the observation data, available and compiled from historical documents. Society has considerably changed since the 19th century, but we issue a serious warning: if such high intensities reoccur, the risks for the present society could be significantly higher.

USE OF CROSS-CORRELATION TECHNIQUES TO ENHANCE MICRO-SEISMICITY MONITORING AND EVENTS LOCATION IN THE NORTH-WESTERN PART OF ROMANIA

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ABSTRACT

The Romanian seismic network has been substantially developed during the last decade, as concerns the number of stations and, implicitly the improvement of the seismic stations coverage. Despite the progress made, there are still regions for which the minimum epicentral distance is larger than 100 km or the coverage might be difficult to achieve due to various reasons (e.g. the border areas, topography). Due to these issues, the monitoring of local micro-seismicity using routine detection and location methods is often difficult, resulting either in the failure of low magnitude events detectability or appearance of significant errors for the location of such events. The goal of the present study is to enhance the detection and location capabilities of the low-magnitude seismic events occurred in the north-western part of Romania (where the coverage of the stations is still poor) by applying the cross-correlation methods. The proposed techniques were tested on the waveforms recorded by the Valea Draganului (DRGR) 3-C seismic station for 2010 - 2016 time interval. The detections of low-magnitude events might be significantly improved through an algorithm based on the correlation of templates events with the continuous waveform recordings, while the location process by an algorithm able to estimates the similarity degree among the waveforms of different events. Application of cross-correlation techniques on the continuous waveforms recorded by the DRGR station for a set of 6 template events let to two times more real detections as compared to those provided by the seismic bulletins routinely released by the National Data Center of the National Institute for Earth Physics, Magurele (Romania). The waveform correlation algorithm applied on the detected events highlighted the existence of several clusters of seismicity. Most of the events detected through this method occurred during the week working days and working hours and were located in the vicinity of active quarries. Accordingly, the associated waveforms show a high degree of similarity, indicating the existence of repetitive artificial seismic sources. The proposed methods proved to be highly efficient for the seismic monitoring purposes, as well as for the seismic event location. Also, they might be easily applied to any other region and for extended seismic waveform databases.

PETROPHYSICAL STUDY OF SZOLNOK FORMATION, ENDROD GAS FIELD, HUNGARY

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ABSTRACT

Abstract Investigation of rock porosity and permeability is highly beneficial for geologists, petro-physicist and petroleum engineers in order to evaluate reservoir anisotropy, and its pore space geometry through the time and space. Clastic reservoir quality and classification could perform based on these data correlations. The Szolnok Formation in the great Hungarian plain is composed mainly of sandstones intercalated with marl and siltstones of delta fringe deposits. In the present study, 213 core samples were obtained from the Szolnok Formation and subjected for petrophysical investigations. Both horizontal and vertical permeability were measured with different techniques. Permeability anisotropy gives unambiguous diagnostic features for reservoir heterogeneity in case of siltstone- marl facies. The Szolnok Formation has two main lithologic facies: 1. clean sandstone (represented in this study by 141 samples) and 2.siltstone- marl (represented by 72 samples). From the interpretation of measured data, it can obviously differentiate among good, intermediate and bad reservoir rocks. Ultrasonic laboratory measurements were carried out for only 30 sandstone core samples. These samples were completely dry, while Sonic Viewer-120 instrument is used to measure seismic velocities, Poisson's ratio and other mechanical properties such as rigidity, bulk modulus and Young's modulus. Gas permeability - seismic wave velocity cross plot indicates that permeability could be outlined from either compressional or shear wave velocity. Effective pore radius is outlined from both porosity and permeability.

CALIBRATION OF CRUSTAL HISTORICAL EARTHQAUKES FROM INTRA-CARPATHIAN REGION OF ROMANIA

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ABSTRACT

The main task of the presented study is to elaborate a set of relations of mutual convergence macroseismic intensity - magnitude, necessary for the calibration of the historical crustal earthquakes produced in the Intra-Carpathian region of Romania, as a prerequisite for homogenization of the parametric catalog of Romanian earthquakes. To achieve the goal, we selected a set of earthquakes for which we have quality macroseismic data and Mw moment magnitude obtained instrumentally. These seismic events were used to determine the relations between the Mw and the peak / epicentral intensity, the izoseist surface area for intensity I =3, I=4 and I=5: Mw = f (Imax / Io), Mw = f (Imax / Io, h), Mw = f (A3, A4; A5). We investigated several variants of such relationships and combinations, taking into account that the macroseismic data necessary for the reevaluation of historical earthquakes in the investigated region are available in several forms. Thus, the previous investigations provided various information resulted after revising initial historical data: 1) Intensity data point (IDPs) assimilated or not with the epicenter intensity after analysis of the correlation level with recent seismicity data and / or active tectonics/seismotectonics, 2) Sets of intensities obtained in several localities (IDPs) with variable values having maxims that can be considered equal to epicentral intensity (Io), 3) Sets of intensities obtained in several localities (IDPs) but without obvious maximum values, assimilable with the epicentral intensity, maps with isoseismals, 5) information on the areas in which the investigated earthquake was felt or the area of perceptiveness (e.g. I = 3 EMS during the day and I = 4 EMS at night) or the surfaces corresponding to a certain degree of well-defined intensity. The obtained relationships were validated using a set of earthquakes with instrumental source parameters (localization, depth, Mw). These relationships lead to redundant results meaningful in the process of estimating the quality and credibility of the primary data used (IDPs, isoseismals) and in the correct determination of Mw.

INVESTIGATION OF GEOTECHNICAL PARAMETERS IN 2D CONDITIONS BY USING GEOPHYSICAL METHODS : CASE STUDY OF BORNOVA PLAIN/IZMIR

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ABSTRACT

The common results obtained from the studies of earthquake-soil-structure common behavior until today show that the possible damages during an earthquake on the structures are related with the dynamic features of soil and soil response spectrums. In this case, behaviour of soil under the dynamic earthquake loads should be determined accurately and reliably in order to control possible damage that may occur during an earthquake. For this purpose, definition of soil-bedrock according to changing of S-wave velocity (Vs), Elasticity Module, Shear Module and density are very important. In line with these concepts, Vs which is a very important parameter that defines the behaviour of the soil during an earthquake and it is one of the initially used data in geotechnical analysis were obtained from 2D multichannel analysis of surface waves (MASW) method in east of Izmir Bay. As a result of total 15 profiles of MASW measurements, it was determined that soil depth is thicker than 30 meters at some profiles and S-wave velocity values suddenly change in horizontal and vertical directions at all profiles. Elasticity module, Shear Module and density parameters were calculated from S-wave velocity values as 2D. In other words, the layers forming the soil are not horizontal, half space, homogeneous and isotropic structure.

SPATIAL VARIATION OF SEISMIC B-VALUES OF THE EMPIRICAL LAW OF THE MAGNITUDE-FREQUENCY DISTRIBUTION FROM A BAYESIAN APPROACH BASED ON SPLINE (B-SPLINE) FUNCTION IN THE NORTH ANATOLIAN FAULT ZONE, NORTH OF TURKEY

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ABSTRACT

In this study, a Bayesian approach based on Spline (B-spline) function is used to estimate the spatial variations of the seismic b-values of the empirical law (G-R law) in the North Anatolian Fault Zone (NAFZ), North of Turkey. B-spline function method developed for estimation and interpolation of b-values. Spatial variations in b-values are known to reflect the stress field and can be used in earthquake hazard analysis. We proposed that b-values combined with seismicity and tectonic background. ?=b*ln(10) function (the derivation of the G-R law) based on a Bayesian approach is used to estimate the b values and their standard deviations. A homogeneous instrumental catalog is used during the period 1900-2017. We divided into ten different seismic source regions based on epicenter distribution, tectonic, seismicity, faults in NAFZ. Three historical earthquakes (1343, MS = 7. 5, 1766, Ms=7.3, 1894, MS = 7. 0) are included in region 2 (Marmara Sea (Tekirdag-Merkez-Kumburgaz-Çinarcik Basins)) where a large earthquake is expected in the near future because of a large earthquake hasn't been observed for the instrumental period. The spatial variations in ten different seismogenic regions are estimated in NAFZ. In accordance with estimates, b-values are changed between 0.52±0.07 and 0.86±0.13. The high b values are estimated the Southern Branch of NAFZ (Edremit Fault Zones, Yenice-Gönen, Mustafa Kemal Pasa, Ulubat Faults) region, so it is related low stress. The low b values are estimated between Tokat-Erzincan region, so it is related high stress. The maps of 2D and 3D spatial variations (2D contour maps, classed post maps (a group the data into discrete classes), image maps (raster maps based on grid files), 3D wireframe (three-dimensional representations of grid files) and 3D surface) are plotted to the b-values. The spatial variations b-values can be used earthquake hazard analysis for NAFZ.

ASSESSMENT OF EARTHQUAKE HAZARD PARAMETERS WITH BAYESIAN APPROACH METHOD AROUND KARLIOVA TRIPLE JUNCTION (EASTERN TURKEY)

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ABSTRACT

In this study, the Bayesian Approach method is used to evaluate earthquake hazard parameters of maximum regional magnitude (Mmax), ? value, and seismic activity rate or intensity (?) and their uncertainties for next 5, 10, 25, 50, 100 years around Karliova Triple Junction (KTJ). A compiled earthquake catalog that is homogenous for Ms ? 3.0 was completed during the period from 1900 to 2017. We are divided into four different seismic source regions based on epicenter distribution, tectonic, seismicity, faults around KTJ. We two historical earthquakes (1866, Ms=7.2 for Region 3 (Between Bingöl-Karliova-Mus-Bitlis (Bahçeköy Fault Zone-Uzunpinar Fault Zone-Karakoçan Fault- Mus Fault Zones -Kavakbasi Fault)) and 1874, Ms=7.1 for Region 4 (Between Malatya-Elazig-Tunceli (Palu Basin- Pütürge Basin-Erkenek Fault-Malatya Fault)) are included around KTJ. The computed Mmax values are between 7.71 and 8.17. The quantiles of functions of distributions of true and apparent magnitude on a given time interval [0,T] are evaluated. The quantiles of functions of distributions of apparent and true magnitudes for next time intervals of 5, 10, 25, 50, and 100 years are calculated for confidence limits of probability levels of 50, 70, and 90 % around KTJ. According to the computed earthquake hazard parameters, Erzincan Basin-Ovacik Fault-Pülümür Fault-Yedisu Basin region was the most seismic active regions of KTJ. Erzincan Basin-Ovacik Fault-Pülümür Fault-Yedisu Basin region is estimated the highest earthquake magnitude 7.16 with a 90 % probability level in the next 100 years which the most dangerous region compared to other regions. The results of this study can be used in earthquake hazard studies of the East Anatolian region.

COMPARISON BETWEEN MACROSEISMIC AND INSTRUMENTAL INTENSITIES FOR RECENT VRANCEA (ROMANIA) MODERATE EARTHQUAKES

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ABSTRACT

Vrancea (Romania) intermediate depth seismic zone, is characterised by the occurrence of moderate earthquakes with magnitudes larger than 5.0 (Mw), and an expected return period of 2.5 years. Despite the estimated return period, during the last period, three earthquakes with Mw>5.0 occurred in Vrancea area in less than 6 months, from September 2016 to March 2017. The macroseismic effects associated with those earthquakes exceeded IV MSK degrees, on the extra-Carpathian area, in populated area. Besides the extended scientific studies, the near real time estimation of the macroseismic intensity became mandatory for the insurance companies to cover some of the losses and damage that earthquakes might cause to houses, belongings, and other buildings. In the present paper, the estimation of seismic intensities using the macroseismic questionnaires was extended with the assessment of instrumental intensities derived from the recorded instrumental data (acceleration, velocity and displacement), as recommended in the Romanian Seismic Intensity Scale Standard (STAS 3684-71). The quantitative study proposed by STAS, using the conversion from recorded data to macroseismic intensity values has limitations. The most important is due to the necessity of more monitoring equipment. At this time, the National Institute for Earth Physics (NIEP), has about 100 accelerometers installed in Romania, this number being much smaller than the number of existing localities on this territory. For this reason, the quantitative method can give us additional information, but is not enough for realising a comprehensive intensity map. In this paper we have compared the computed instrumental intensities with those reported by people that have filled in the questionnaires from the NIEP web page or from the mobile application.

This paper was partially carried out within Nucleu Program, supported by ANCSI, projects no. PN 16 35 01 06, PN 16 35 03 01, PN 16 35 01 01 and the Partnership in Priority Areas Program - PNII, under MEN-UEFISCDI, DARING Project no. 69/2014 and a grant of the Romanian National Authority for Scientific Research and Innovation (ANCSI) - UEFISCDI, project number PN-II-RU-TE-2014-4-0701

MASW SEISMIC METHOD APPLIED IN BREBU LANDSLIDE AREA (ROMANIA)

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ABSTRACT

This paper is focused on assessing the possibility of enhancing the geotechnical information in perimeters with landslides, especially through applications of the Multichannel Analysis of Surface Waves (MASW) method. The technology enables the determination of the phase velocities of Rayleigh waves and, recursively, the evaluation of S-shear wave velocities (VS) related depth. Finally, using and P - longitudinal wave velocities, derived from the seismic refraction measurements, in situ dynamic elastic properties in a shallow section can be obtained. The investigation was carried out in the Brebu landslide (3-5 m depth of bedrock), located on the southern flank of the Slanic Syncline (110 km North of Bucharest) and included a drilling program and geotechnical laboratory observations. The seismic refraction records (seismic sources placed at the center, ends and outside of the geophone spread) have been undertaken on two lines (respectively, 23 and 46 m long) approximately perpendicular to the downslope direction of the landslide and on different local morpho-structures. A Geode Geometrics seismograph was set for 1 ms sampling rate and pulse summations in real-time for five blows. Twentyfour 14 Hz vertical Geometrics SpaceTech geophones were disposed at 1 m spacing along the receiver line. The seismic source was represented by the impact of a 8 kg weight sledge hammer on a metal plate. Regarding seismic data processing, the distinctive feature is related to performing more detailed analyses of MASW records. The proposed procedure consists of the spread (24 receivers) split in groups with fewer receivers (five channels were used) and several interval-geophones superposed (two overlapped intervals were selected). 2D Fourier analysis, f-k spectrum (frequency - wave number) spectrum, for each of these groups assure the information continuity and, all the more, accuracy to pick out the amplitude maximums of the f-k spectra. Meanwhile this specifically selected sub-array accomplishes a two-fold coverage to evidence the information. Finally, combining both values VS(calculated from 2D spectral analyses of Rayleigh waves) and VP (obtained from seismic refraction records) graphycsof mean geodynamic parameter evolution related depth were constructed. The value differentiations refering to slope stability are revealed. Lowest values of Vs and both shear and longitudinal moduli are defined for the area with landslide rock-mass, in opposition with stable land for which biggest values for same parameters are revealed. Intermediate values are signalized above the main plane of sliding, zone classified unstable.

IMPACT OF RESERVOIR FLUID SATURAION ON SEISMIC PARAMETERS: ENDROD GAS FIELD, HUNGARY

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ABSTRACT

Outlining the reservoir fluid types and saturation is the main object of the present research work. 37 core samples were collected from three different gas bearing zones in the Endrod gas field in Hungary. These samples are belonging in age to the Miocene and the Upper - Lower Pliocene. These samples were prepared and then conducted to laboratory measurements. Compression and shear wave velocity were measured using the Sonic Viewer-170- OYO. The sonic velocities were measured at frequencies of 63 and 33 kHz for compressional and shear wave respectively. All samples were subjected to complete petrophysical investigations. Sonic velocities and mechanical parameters such as young's modulus, rigidity, and bulk modulus were measured when samples were saturated by 100%-75%-0% brine water. Several plots have been performed to show the relationship between seismic parameters and saturation percentages. Robust relationships were obtained and showing the impact of fluid saturation on seismic parameters. Seismic velocity, Poisson's ratio, bulk modulus and rigidity prove to be applicable during hydrocarbon exploration or production stages. Relationships among the measured seismic parameters in gas/water fully and partially saturated samples are useful to outline fluid type and saturation percentage especially in gas/water transitional zones.

PETROPHYSICAL STUDY OF SZOLNOK FORMATION, ENDROD GAS FIELD, HUNGARY

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ABSTRACT

Investigation of rock porosity and permeability is highly beneficial for geologists, petro-physicist and petroleum engineers in order to evaluate reservoir pore space geometry through the time and space. Clastic reservoir quality and classification could perform based on the petrophysical data correlations. Study of the Szolnok Formation in is our target. It composed mainly of sandstones with clay-marlstone and siltstones. Two hundred thirteen core samples of Upper and Lower Pliocene and Miocene age were subjected for petrophysical investigations. Pore size distribution using MICP, Mercury and Helium porosity, horizontal and vertical permeability were measured for studied core samples. The Szolnok Formation has two main lithologic facies: a. 141 clean sandstone samples and b. 72 siltstone and clay- marlstone samples. Ultrasonic laboratory measurements were carried out for only 30 selected sandstone core samples. Sonic viewer-120 is used to measure sonic velocities and other mechanical properties such as rigidity, bulk modulus and Young's modulus. Gas permeability and Helium porosity were plotted versus sonic wave velocity indicates that both permeability and porosity could be outlined from either compressional or shear wave velocity. Effective pore radius is outlined from both of them. The highest sample porosity was recorded for the Miocene in age followed by the Lower Pliocene and then for the Upper Pliocene samples respectively. Miocene samples exhibit relative clay free followed by Lower Pliocene samples because they have higher sonic velocity (Vp and Vs) than the Upper Pliocene samples. The Miocene and Lower Pliocene samples have relatively lower dynamic mechanical parameters than Upper Pliocene samples which represent good gas reservoirs in the Endrod field. Several regression line equations with high coefficient of correlation have been calculated to predict Szolnok reservoir parameters.

REMOTE SENSING APPLICATION IN ASSESSMENT LAND COVER CHANGES, LAND USE PATTERNS, AND LAND CAPABILITIES IN AL-QASSIM REGION, SAUDI ARABIA

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ABSTRACT

Land use/land cover mapping is important for conservation of natural resources and also for sustainable land management practices. Remote sensing techniques provides promising possibilities for mapping land use/land cover classes since remotely sensed data cover a large area, in a periodic manner. The Qassim region of central Saudi Arabia is one of the most important agricultural regions in the country especially for date cultivation. In the present study, landsat TM and ETM+ data for the period 1999-2013 are used to study the land use, land cover changes in the area. Satellite images from path/row 168/042 constitute the study area. Three major land use/land cover classes are considered: hilly areas (364,407 ha), vegetated land (1,776,698 ha), and sand dunes (1,523,669 ha). The vegetated land constitutes the class 1, which is comprised of the wadis mainly devoted used for for date production. Sand dunes are designated the class 11 and covered a large portion of the study area whereas theHilly aareas are unproductive and constitute as class 111. The vegetative land are surrounded by sand dune which is the most fragile system of the area and leads to damage some productive lands in the area. it is necessitates to study the area for suitable land management practices and for possible approach to stop the sand drifting or sand encroachment in the area. The land use capabilities classification of the study area includes three main classes: LUC I, LUCII, and LUC III. Slopes ranging between 0° and 20° correspond to areas that are flat, gently undulating, undulating, rolling, strongly rolling, moderately steep and steep, respectively. The slope categories dictate the usage patterns of the lands in the study area, which range from suitable to unsuitable to productive lands.

MODERN GEODYNAMICS OF SOUTH YENISEI RIDGE TO RESULTS OF THE GPS / GLONASS OBSERVATIONS

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ABSTRACT

It was decided in the late 90s to build the first in Russia deep nuclear waste repository within Nizhnekansky granitoid massif, in the southern part of the Yenisei Ridge. In this regard, in 2010 experts of GC RAS and FSUE FNA "GHK" created a geodynamic testing ground for monitoring of crustal movements based on GPS / GLONASS global navigation satellite systems. Over the last five years 30 stations of the geodynamic polygon carried out regular observations. Yenisei Ridge is located at the junction of major tectonic structures - the Siberian Platform and West Siberian Plate. Its southern part is characterized by stable tectonic regime, the average speed of uplift according to geological data is 0.2-0.3 mm per year with the total amplitude of 400-500 m. However, the speed of modern movements of the Earth's crust is by more than an order of magnitude higher due to the temporary effect of large-scale geodynamic movements. The Yenisei river divides the area into two parts. The left bank is characterized by predominantly negative vertical movements and the right bank by positive ones. The major tectonic disturbances occur in the areas of the Muratovsky, Atamanovsky, Pravoberezhny and Bolshetelsky submeridional faults. We investigated the dynamics of changes in the lengths of □L baselines for separate epochs of observations. In 2010-2013 the absolute values of □L were significantly lower than for the periods 2013-2014 and 2014-2015. For the entire observation period the average value of the differences of the line lengths is 3.8 mm. This suggests that in general the area experienced strain during the period 2010-2015. Maps of the Earth's surface dilatation zones (deformation rate) showed that the maximum deformations were recorded in the area of Muratovsky and Atamanovsky faults located at the junction of the Siberian Platform and West Siberian plate. For quality control and evaluation of the accuracy of the measurement results a network adjustment was performed. For comparison, the estimations of the mean square error (MSE) for the period 2012-2015 were shown. The accuracy estimation at the final stage of the equalization calculation provided the most reliable data on the real accuracy of points of the local geodetic network. The MSE of the points' location has shown that the MSE of horizontal and vertical accuracy amounted to 3.0-3.7 and 6.0-6.5 mm, respectively. Thus, it is evident that the greatest □L changes during the movements' intensification were caused by geodynamic reasons, and not by noise or possible technical errors in observations or calculations. The observations will be continued in order to facilitate the development of the area deformation maps and to reveal the geodynamic, tectonic and seismic conditions for the construction of deep nuclear waste repository in accordance with the existing regulations, including the IAEA requirements.

STUDY INTO POINT CLOUD GEOMETRIC RIGIDITY AND ACCURACY OF TLS-BASED IDENTIFICATION OF GEOMETRIC BODIES

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ABSTRACT

Capability of obtaining a multimillion point cloud in a very short time has made the Terrestrial Laser Scanning (TLS) a widely used tool in many fields of science and technology. The TLS accuracy matches traditional devices used in land surveying (tacheometry, GNSS -RTK), but like any measurement it is burdened with error which affects the precise identification of objects based on their image in the form of a point cloud. The points coordinates are determined indirectly by means of measuring the angles and calculating the time of travel of the electromagnetic wave. Each such component has a measurement error which is translated into the final result. The XYZ coordinates of a measuring point are determined with some uncertainty and the very accuracy of determining these coordinates is reduced as the distance to the instrument increases. The paper presents the results of examination of geometrical stability of a point cloud obtained by means terrestrial laser scanner and accuracy evaluation of solids determined using the cloud. A Leica P40 scanner and two different settings of measuring points were used in the tests. The first concept involved placing a few balls in the field and then scanning them from various sides at similar distances. The second part of measurement involved placing balls and scanning them a few times from one side but at varying distances from the instrument to the object. Each measurement encompassed a scan of the object with automatic determination of its position and geometry. The desk studies involved a semiautomatic fitting of solids and measurement of their geometrical elements, and comparison of parameters that determine their geometry and location in space. The differences of measures of geometrical elements of balls and translations vectors of the solids centres indicate the geometrical changes of the point cloud depending on the scanning distance and parameters. The results indicate the changes in the geometry of scanned objects depending on the point cloud quality and distance from the measuring instrument. Varying geometrical dimensions of the same element suggest also that the point cloud does not keep a stable geometry of measured objects.

APPLICATION OF INTEGRATED PHOTOGRAMMETRIC AND TERRESTRIAL LASER SCANNING DATA TO CULTURAL HERITAGE SURVEYING

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ABSTRACT

The terrestrial laser scanning technology has a wide spectrum of applications, from land surveying, civil engineering and architecture to archaeology. The technology is capable of obtaining, in a short time, accurate coordinates of points which represent the surface of objects. Scanning of buildings is therefore a process which ensures obtaining information on all structural elements a building. The result is a point cloud consisting of millions of elements which are a perfect source of information on the object and its surrounding. The photogrammetric techniques allow documenting an object in high resolution in the form of orthophoto plans, or are a basis to develop 2D documentation or obtain point clouds for objects and 3D modelling. Integration of photogrammetric data and TLS brings a new quality in surveying historic monuments. Historic monuments play an important cultural and historical role. Centuries-old buildings require constant renovation and preservation of their structural and visual invariability while maintaining safety of people who use them. The full process of surveying allows evaluating the actual condition of monuments and planning repairs and renovations. Huge sizes and specific types of historic monuments cause problems in obtaining reliable and full information on them. The TLS technology allows obtaining such information in a short time and is non-invasive. A point cloud is not only a basis for developing architectural and construction documentation or evaluation of actual condition of a building. It also is a real visualization of monuments and their entire environment. The saved image of object surface can be presented at any time and place. A cyclical TLS survey of historic monuments allows detecting structural changes and evaluating damage and changes that cause deformation of monument's components. The paper presents application of integrated photogrammetric data and TLS illustrated on an example of historic monuments from southern Poland. The cartographic materials are a basis for determining the actual condition of monuments and performing repair works. The materials also supplement the archive of monuments by means of recording the actual image of a monument in a virtual space.

TEACHING MAP CONCEPTS IN SOCIAL SCIENCE EDUCATION: AN EVALUATION WITH UNDERGRATE STUDENTS

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ABSTRACT

Today, maps are encountered almost everywhere, and maps are needed more than ever before. Effective use of maps should be taken from the first years of basic education. For this reason, it is especially important that the geography and social sciences education departments of universities are successful in teaching map reading and perception skills. The students who will graduate from these departments have an important role in teaching the map concepts since they will be teachers of the future. When the curriculum of Social Studies Education of Universities is examined in general, it is seen that basic map concepts are not included in teaching plans, and general map information and cartography are not included. It is not expected that prospective teachers who have graduated without sufficient education on map can benefit from the maps effectively in their lessons and educate students well in this subject. Geographical location, one of the most important map concepts, not only determines or influences the physical conditions such as climate, vegetation, water resources, soil types, but also plays an important role in determining the social and economic structure of the country and its strategic importance. Geographical location is specified by geographical coordinates called latitude and longitude. The geographical coordinate system is the primary spatial reference system of the earth. It is always used in cartography, in geography, in basic location calculations such as navigation and surveying. The purpose of this study is to evaluate the knowledge of the geographical location which is one of the basic map concepts of the students in social sciences education before graduation. For this purpose, a research has been carried out on questions and activities related to geographical location and related concepts. The details and results of the research conducted by the students in the study are explained.

PERFORMANCE EVALUATION OF REAL-TIME PRECISE POINT POSITIONING METHOD

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ABSTRACT

Post-Processed Precise Point Positioning (PPP) is a well known zero-difference positioning method which provides accurate and precise results. After the experimental tests, IGS Real Time Service (RTS) officially provided real time orbit and clock products for the GNSS community that allows real-time (RT) PPP applications. Different software packages can be used for RT-PPP. In this study, in order to evaluate the performance of RT-PPP, 3 IGS stations are used. Results, obtained by using BKG Ntrip Client (BNC) Software v2.12, are examined in terms of both accuracy and precision.

INVESTIGATION OF MATRAKCI NASUH'S KONYA MINIATURE IN TERMS OF CARTOGRAPHY

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ABSTRACT

The map has become very important role throughout the human life. Even during the Ottoman history, it is possible to encounter many products bearing map quality. The Ottoman Empire, which had a very large landscape, needed products as a guide to determine its existing borders and to learn new places. As in other sciences, in the field of geography and cartography, the Ottomans produced important works. Maps produced especially in the 16th century had an important place in Ottoman cartography. In particular, the world map designed by Piri Reis is valuable in terms of quality even today. Although both lived in the same period, researchers had more interest to piri reis' maps than Matrakci Nasuh's miniatures. However, while the maps of Piri Reis in terms of marine cartography is crucial, Matrakci's miniatures are valuable in terms of landscape cartography. Over 100 miniatures designed by Matrakci during the east and west expeditions should be evaluated in terms of city planning and cartography. The aim of this study is to examine Matrakci's Konya miniature in terms of cartography and to detect its importance as a map and city plan by determining the geometric and topological accuracy. In this context, landmarks such as mosque, mountain, etc. in the miniature were compared with maps and Google Earth images obtained by today's technology. In addition, the miniature was evaluated with the MapAnalyst software used to determine the geometric accuracy of historical maps and examined in terms of geometric and topological accuracy. Results indicated that although geometrical accuracy of the miniature was poor, topological accuracy was good.

ESTABLISHING BASE ELEMENTS OF ERSPECTIVE IN ORDER TO RECONSTRUCT ARCHITECTURAL BUILDINGS FROM PHOTOGRAPHS

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ABSTRACT

The use of perspective images, especially historical photographs for retrieving information about presented architectural environment is a fast developing field recently. The photography image is a perspective image with secure geometrical connection with reality, therefore it is possible to reverse this process. The aim of the herby study is establishing requirements which a photographic perspective representation should meet for a reconstruction purpose, as well as determination of base elements of perspective such as a horizon line and a circle of depth, which is a key issue in any reconstruction. The starting point in the reconstruction process is geometrical analysis of the photograph, especially determination of the kind of perspective projection applied, which is defined by the building location towards the projection plane. Next, proper constructions can be used. The paper addresses the problem of establishing base elements of perspective on the basis of the photograph image in the case when camera calibration is impossible to establish. It presents different geometric construction methods selected dependently on the starting assumptions. Therefore, the methods described in the paper seem to be universal. Moreover, they can be used even in the case of poor quality photographs with poor perspective geometry. Such constructions can be realized with computer aid when the photographs are in digital form as it is presented in the paper. The accuracy of the applied methods depends on the photography image accuracy, as well as drawing accuracy, however, it is sufficient for further reconstruction. Establishing base elements of perspective presented in the paper is especially useful in difficult cases of reconstruction, when one lacks information about reconstructed architectural form and it is necessary to lean on solid geometry.

PROPOSALS FOR LAND CONSOLIDATION PROJECT SOLUTIONS FOR SELECTED FRAGMENTS OF PROBLEM AREAS

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ABSTRACT

One of the economic tools for supporting agricultural policy are the activities implemented under the Rural Development Program (RDP). By supporting agricultural activities and creating equal opportunities for development of farms, among others in areas with unfavourable environmental conditions characterized by low productivity of soils exposed to degradation, decision makers can contribute to improving the spatial structure of rural areas. In Poland, one of the major concerns are agricultural problem areas (regions). In view of this situation, the aim of this article was to characterize the problem areas in question and propose land consolidation project solutions for selected fragments of those areas. This paper presents the results of a review of literature and an analysis of geodetic and cartographic data regarding the problem areas. The process of land consolidation, which is one of the technical and legal instruments supporting the development of rural areas, was characterized. The study allowed the present authors to establish criteria for selecting agricultural problem areas for rational land management through implementation of consolidation programmes. To develop a proposal for rational management of the problem areas, key general criteria (location, topography, soil quality and usefulness) and specific criteria were defined and assigned weights. A conception of alternative development of the agricultural problem areas was created as part of a land consolidation project. The results were used to create a methodology for the development of agricultural problem areas to be employed during land consolidation in rural areas. Every agricultural space includes areas with unfavourable environmental and soil conditions determined by natural or anthropogenic factors. Development of agricultural problem areas through land consolidation should take into account the specific functions assigned to these areas in land use plans, as well as to comply with legal regulations.

METHODOLOGY OF HIERARIZATION OF THE WORK OF LAND CONSOLIDATION AND LAND EXCHANGE

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ABSTRACT

Land consolidation is one of the basic development activities in rural areas intended to comprehensively improve the organization of agricultural production space. Merging and exchange of parcels are aimed at transforming a fragmented and "checkerboarded" landscape containing excessively long fields into plots as large and regular as possible. Land consolidation decisions are based on detailed analyses of relevant parameters. Properly carried out land consolidation creates an opportunity to organize agricultural holdings in an appropriate way, and, at the same time, to preserve the natural environment. Consolidation provides appropriate conditions for sustainable and multi-functional rural development by limiting the harmful influence of intensive agriculture on the natural environment. It also leads to an improvement in living and working conditions for inhabitants of rural areas. The analysis conducted in this study was aimed at singling out villages in the commune of Mniszków in which consolidation of arable land was required most urgently. Factors describing the investigated villages were selected on the basis of a comprehensive analysis of the natural, social, economic and financial conditions found in those localities. The analysis was conducted using data obtained from the Land and Property Register of the District Office in Opoczno and data from the Office of the Commune of Slawno. The study allowed us to determine which areas required land consolidation and exchange interventions, thus becoming a basis for applying for financial resources necessary to reach the aforementioned goal. A special role in empirical studies, especially comparative studies, of human activity is played by taxonomic methods, which involve linear ordering of items according to a synthetic indicator characterizing those items, which is calculated on the basis of a set of shared features. These methods are widely used in econometrics and socio-economic research to create all kinds of development rankings, based on multi-faceted data concerning the objects under analysis.The aim of the present study was to establish the need for land exchange and consolidation in the villages of the commune of Mniszków, district of Opoczno, Lódz Voivodeship. The ranking was established using Hellwig's synthetic indicator of development and the zero unitarisation method. A result of the analyzes was answer to the question on how different methods of aggregation of the same diagnostic variables affect the final results and whether it can be applied in such type of studies.

METHODOLOGY FOR ASSESSING THE SIZE AND LIQUIDATION OF THE OUTER CHESSBOARD

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ABSTRACT

A patchwork of land ownership is one of the factors that exert a negative influence on both the organization and the level of agricultural production. Excessive land fragmentation decreases the intensity of agricultural practices and increases production costs, thus leading to a continuous reduction in income. In many areas of Poland, over the years, fields have been divided into smaller and smaller parcels, which, along with the mass migration of people to towns and abroad, resulted in a faulty land ownership structure. Nowadays, it is recommended that measures be taken to eliminate both internal and external patchworks of farmland. Two such agricultural land management measures are land consolidation and land exchange. Rural areas in Poland require profound structural changes related to agricultural production, the size of agricultural holdings, the distribution of farmland in an agricultural holding, as well as demographic, spatial and institutional structure. Land consolidation and land exchange not only result in improved living and working conditions for farmers, but also contribute to enhancing the environmental and cultural assets of a village. The study allowed conducted using checkerboard matrix tables which allow one to determine the share of farmland owned by local and out-of-village non-residents. Research based on data from the estate cadastre. The research used information on the number of land owners, the number of parcels of land, the area of these parcels. The study computed the distance between 34 villages located in Slawno municipality, Opoczno county, Lodz voivodship. An approach like this allows one to establish a program of exchange of land between these two groups of owners and to eliminate the problematic patchwork of land ownership through land exchange and consolidation.

VERTICAL DISPLACEMENTS ANALYSIS OF MEASUREMENTS ACHIEVED BY LASER STATION

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ABSTRACT

Measurement of the vertical movements of the methods is to determine the geodetic position changes of points situated on a controlled object and all its components. Such measurements require high precision, which can be achieved by use of appropriate measuring techniques and equipment. Contemporary measurement methods provide the ability to perform tasks that traditional methods have not yet allowed, while providing the required precision. The paper presents an analysis of vertical displacement measurements made using the Leica TDRA6000 laser station, as an alternative to the precision leveling method. The article presents the author's stabilization method of measurement points and the technical guidelines for measurement implementation. The analysis of the data obtained from the measurements allowed us to formulate conclusions about the measurement technology and the accuracy of the results obtained.

USING GROUND RADAR INTERFEROMETRY FOR PRECISE DETERMINING OF DEFORMATION AND VERTICAL DEFLECTION OF STRUCTURES

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ABSTRACT

The paper describes possibilities of the relative new technics – ground based radar interferometry for precise determining of deformation of structures. Special focus on the vertical deflection of bridge structures and on the horizontal movements of high-rise buildings and structural objects is presented. The technology of ground based radar interferometry can be used in practice to the contactless determination of deformations of structures with accuracy up to 0.01 mm in real time. It is also possible in real time to capture oscillations of the object with a frequency up to 50 Hz. Deformations can be determine simultaneously in multiple places of the object, for example a bridge structure at points distributed on the bridge deck at intervals of one or more meters. This allows to obtain both overall and detailed information about the properties of the structure during the dynamic load and monitoring the impact of movements either individual vehicles or groups. In the case of high-rise buildings, it is possible to monitor the horizontal vibration of the whole object at its different height levels. It is possible to detect and determine the compound oscillations that occur in some types of buildings. Then prevent any damage or even disasters in these objects. In addition to the necessary theory basic principles of using radar interferometry for determining of deformation of structures are given. Practical examples of determining deformation of bridge structures, water towers reservoirs, factory chimneys and wind power plants are also given. The IBIS-S interferometric radar of the Italian IDS manufacturer was used for the measurements.

POSSIBILITIES OF USE OF AIR-SECURED AIRCRAFT FOR INSPECTION OF TECHNICAL BUILDING OBJECTS

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ABSTRACT

In recent years, Unmanned Aerial Vehicles (UAVs) have been used in various sectors of the economy. This is due to the development of new technologies for acquiring and processing geospatial data. The paper presents the results of experiments using UAV, equipped with a high resolution digital camera, for a visual assessment of the technical condition of the building roof and for the inventory of energy infrastructure and its surroundings. The usefulness of digital images obtained from the UAV deck is presented in concrete examples. The use of UAV offers new opportunities in the area of technical inspection due to the detail and accuracy of the data, low operating costs and fast data acquisition.

DETERMINATION OF THE TERRITORIAL SEA BASELINE - MEASUREMENT ASPECT

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ABSTRACT

Determining the course of the territorial sea baseline (TSB) of the coastal state is the basis for establishing its maritime boundaries, thus becoming indirect part of maritime policy of the state. Besides the following aspects: legal and methodological as described in the conventions, acts, standards and regulations, equally important is the issue of measurement methodology with respect to the boundaries of the territorial sea. The publication discussed accuracy requirements of the TSB measurement implementation, the relationship of sea level with a choice of the method of its determination, and discussed the implementation of such a measurement on a selected example. As the test reservoir was used the 400-meter stretch of the public beach in Gdynia. During the measurements they used the GNSS geodetic receiver operating in real time based on the geodetic network - VRSnet.pl. Additionally, a comparison was made of the applied method with analogous measurements of the TSB performed in 1999.

DETERMINATION OF SHIFT BIAS IN DIGITAL AERIAL TRIANGULATION OF UAV IMAGERY SEQUENCES

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ABSTRACT

Despite so fast development UAV photogrammetry still exists the necessity of accomplishment Automatic Aerial Triangulation (AAT) on the basis of the observations GPS/INS and via ground control points. In the Aerial Triangulation the network of control and tie points is being observed in the photogrammetric block and each image's orientation is estimated via bundle adjustment. In case of classical air photogrammetry elements of the external orientation of each image from the block are determined at greater participation of supervision of integrated of GNSS/IMU system at the smaller number of photo points. In case of applying observation single frequency absolute position and orientation of each image In UAV of photogrammetry a substantial amount of ground control points measured in the field is required. The approximate elements of external orientation delivered by GNSS/IMU set up on UAV are usually burdened biases in navigation date (e.g uncertainty of period), which they can step out and very often they are difficult to the detection. During low altitude photogrammetric flight, the approximate elements of external orientation registered by UAV are burdened with the influence of some shift bias errors. In this article, methods of determination bias shift error are presented. In the process of the digital aerial triangulation two solutions are applied. In the first method shift bias error was determined together with the drift bias error, elements of external orientation and coordinates of ground control points. In the second method shift bias error was determined together with the elements of external orientation, coordinates of ground control points and drift bias error equals 0. When two methods were compared the difference for shift bias error is more than ±0.01 m for all terrain coordinates XYZ.

DIFFERENT LAW APPLICATIONS IN LAND CONSOLIDATION WORKS IN TURKEY

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ABSTRACT

The total mass of the earth remains largely stable while the world population increases with rapid acceleration. Nutrition, which is the most important necessity of increasing population, is mainly met the requirement by soil. Since the amount of land to be farmed cannot be increased at the same rate as the population, it is necessary to obtain maximum efficiency from existing agricultural land. In addition to this, agriculture and animal husbandry have great importance in the economies of many countries such as Turkey. The division of agricultural land into smaller parts by means of inheritance etc. will lead to inefficient farming after many years. Increasing the yield from agriculture is mainly carried out by Land Consolidation works, which are applied by means of combining the shrinking, split, and unused areas. Land consolidation works in Turkey started in 1961 and, over time, continued with different laws and regulations. In this study, examples of different law applications of Land Consolidation works in Turkey are explained. These works are implemented on the basis of the Law No. 3083 "Agricultural Reform for Land Regulation in Irrigation Areas", the Law No. 5403 "Soil Conservation and Land Use" and the statutes, regulations and technical orders connected these laws apply. By the Law No. 3083, the authority to implement was granted to the General Directorate of Agricultural Reform and public legal entities and institutions that are in need are allowed to project "Private Land Consolidation" by Law No. 5403. The soil samples from the project site are analyzed in the laboratory and the index map indicating the soil characteristics is prepared in the applications made by both two laws for the soil surveys. However, rating maps are created with different formulas. By the Law No. 3083, parcel index value is calculated according to the asset, land, position, road and commission points, it is formulated according to soil, productivity and location scores by the other law. In both of these applications, farmers' wishes are taken into account when new parcel locations are identified. One of the most important differences in practice is in the areas where deductions are made. It is not possible to deduct from pasture parcels according to the law 5403. At land consolidation implemented by the Law No. 3083 of Gülpinar and Sofular Villages, Gülagaç-Aksaray, pasture parcels area decreased in the ratio of %9,37 by virtue of Common Facilities Share. Contrary to this, deducting wasn't implemented on pasture parcels at the project by the Law No. 5403 of Eskialibey and Toyhane Villages, Bayat-Çorum. As a result, it is suggested that these works should be integrated within a single law so that the differences in practice in land consolidation works can be avoided.

APPLICATION OF REMOTE SENSING DATA ANALYSIS IN LITHOLOGICAL MAPPING OF PRECAMBRIAN ROCKS AT KORAB KANSI AREA, SOUTH EASTERN DESERT OF EGYPT

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ABSTRACT

Gabal Korab Kansi area in the extreme South Eastern Desert of Egypt comprises Precambrian metamorphosed dismembered ophiolitic assemblages thrusted over the metasediments and calc- alkakline island-arc metavolcanic assemblages. The whole sequence is intruded by syn to late tectonic mafic-ultramfic and granitoids intrusions including gabbro-diorite, granodiorite-tonalite and late tectonic layered gabbro and monzogranite. The integrated remote sensing data of landsat-8 and ASTER images including principal component analysis, band rationing and various ASTER indices have been used to discriminate and identify the exposed lithological units. The present study concluded that, the processed remotely sensed data of ASTER (PC2, PC6, PC5) and Landsat-8 (PC4, PC5, PC2) are effective in discriminated most of the widely-exposed basement rock units in the study area. The Landsat-8 band ratio images (b6/b2, b6/b7) and (b6/b5 x b4/b5) differentiated these lithological units with enhanced lithological boundaries. The various ASTER indices including; calcite, carbonate, Kaolinite, clay and sericite-muscovite indices images successfully identified the different exposed rock units based on their enrichment with in some essential and secondary minerals. Based on the field investigation, petrographic study and the interpreted remote sensing data, a detailed lithological map for the study area with enhanced lithological boundaries has been produced.

USE OF GRACE AND RELEVANT REMOTE SENSING DATA TO ESTIMATE SPATIAL AND TEMPORAL CHANGES IN WATER STORAGE OVER THE NUBIAN SANDSTONE AQUIFER SYSTEM, WESTERN DESERT, EGYPT

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ABSTRACT

The Nubian Sand Stone Aquifer System (NSAS; area: 2.2 x 106 km2) shared by Egypt, Libya, Chad, and Sudan is one of the largest groundwater systems in the world. NSAS consists of three main sub-basins: Dakhla, Northern Sudan Platform, and Kufra. An integrated approach is developed and applied to (1) map the spatial distribution of recharge and depletion areas, (2) quantify the recharge and depletion rates, (3) examine the sub-basins connectivity, and (4) identify role of the structural elements (e.g., uplift, shear zone) on the groundwater accumulation and flow. Temporal (04/2002-03/2016) Gravity Recovery and Climate Experiment (GRACE), land surface models (GLDAS, CLM4.5), rainfall (TRMM, CMAP) datasets were used in this study. Our findings include: (1) the Northern Sudan Platform and the Kufra sub-basins represent the recharge areas of the NSAS, (2) the Dakhla sub-basin represents the depletion areas of the NSAS, (3) the NSAS recharge areas are receiving 65 km3 of rainfall each year, (4) the average annual recharge rates over the NSAS recharge areas are estimates at 4.24 km3, (5) the average annual recharge rates represents ~6.5 % of the average annual rainfall, (6) the average annual groundwater depletion rates over the Dakhla sub-basin are estimates at 1.73 km3, (7) the observed GRACE-derived groundwater depletions over the Dakhla sub-basin are highly correlated with the groundwater extraction activities, (8) the observed groundwater depletion over the Dakhla sub-basin is properly related to the presence of the east-west trending Uweinat-Aswan basement uplift, that impedes the south-to-north groundwater flow within the NSAS, (9) compared to the Dakhla sub-basin, the Northern parts of the Kufra sub-basin is witnessing a steady-state conditions that are probably related to the presence of the major northeast-southwest trending shear zone (Pelusium shear system), and (10) Pelusium is apparently providing a preferred groundwater flow pathway from the northern parts of the Dakhla sub-basin. Based on the results of this study over the Dakhla sub-basin, we recommend the following: (1) detailed gravity survey should be conducted to define the spatial subsurface distribution of the Pelusium shear system, (2) hydraulic conductivity measurements in wells along, and at, both northern and southern sides of the Pelusium shear zone should be collected and examined, (3) temporal groundwater levels data should be collected to validate the GRACE-derived groundwater rates, and (4) new reclamation areas should be centered over the northern parts of the Dakhla sub-basin along the Pelusium shear system

PROBABILSITC GROUNDWATER PRODUCTIVITY POTENTIAL MAPPING FOCUSING ON TERRAIN ANALYSIS

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ABSTRACT

A systematic groundwater survey has been conducted in Korea from year of 2000 and the survey has been carried out to find groundwater potential areas. Nevertheless, none of the objective scientific methods may be widely recognized to be appropriate to assess groundwater in a particular area. So, the purpose of the study is to mapping of Groundwater Productivity-Potential (GPP) using probabilistic model, Frequency ratio (FR) in GIS environment. To map GPP, the relationships between topographic, geologic, land surface and hydrologic factors and the groundwater-productivity data with Transimisity (T) and Specific Capacity (SPC) were analyzed using the FR model in Okcheon country, Korea. So, the topographic, geologic, soil and land use maps and the T and SPC value were collected from 98 wells. Especially, considering the difficulty of data collection, the many factors were extracted using terrain analysis of DEM which is cacluated from topographic map. The wells which have T and SPC value were randomly divided to 50%/50% as training wells/validation wells. So, the total of 22 factors such as slope, aspect, Topographic Wetness Index (TWI), slope Length and Steepness Factor (LS-Factor), valley depth, plan curvature, profile curvature, convergence index, relative slope position, distance to channel network, channel network base level, drainage basins, closed depressions, hydrogeology, distance to fault, distance to lineament, lineament density, land use, land cover, soil topology, hydraulic slope and depth to groundwater are extracted and compared with T and SPC value of training wells in the study area using FR model. As the result, the 17 factors such as slope, aspect, TWI, LS-Factor, line density, valley depth, profile curvature, convergence index, relative slope position, distance to channel network, hydrogeology, distance to fault, distance to lineament, land-use, soil topology, hydraulic slope and depth to groundwater were strongly related to the T and SPC and hence the factors were integrated to make GPP maps through the FR model. For the validation of the GPP, the area-under-the-curve (AUC) analysis was performed by using the validation well data. The accuracies achieved are 81.46% and 82.57% for T and SPC, respectively. It proves that the topographic factor and FR model will be highly conducive to developing useful groundwater resources. The topograhic factors and FR model proposed in this study and the resulting GPP maps can be applied in establishing development and management plans for the regional groundwater-development planning and the identification of promising areas for groundwater developmentbased on a systematic, objective, and scientific decision model. The resulting maps can also help planners to select locations suitable for implementing further detailed explorations.

SECURE AND EFFICIENT TRANSMISSION OF HYPERSPECTRAL IMAGES FOR GEOSCIENCES APPLICATIONS

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ABSTRACT

Hyperspectral images are acquired through air-borne or space-borne special cameras (sensors) that collect information coming from the electromagnetic spectrum of the observed terrains. Hyperspectral remote sensing and hyperspectral images are used for a wide range of purposes: originally they were developed for mining applications and for geology because of the capability of this kind of images to correctly identify various types of underground minerals by analizing the reflected spectrums, but their usage has spread in other application fields such as ecology, military and surveillance, historical research and even archeology. The large amount of data obtained by the hyperspectral sensors, the fact that these images are acquired at a high cost by air-borne sensors and that they are generally transmitted to a base, makes it necessary to provide an efficient and secure transmission protocol between the airplane (or satellite) and the base where these data shall be analysed. In this research we present a new transmission framework, composed by a lossless compression algorithm based on linear prediction coupled with a lossless, invisible watermarking scheme which embeds hidden information into a hyperspectral image. Moreover, our scheme can also be enhanced also with digital signature techniques, in order to guarantee the inalterability of the hyperspectral data. The coupling of the compression and the watermarking algorithm has been carefully analysed both on the theoretical side and on the practical side. The theoretical analysis has proven that the complexity of both algorithms is limited and therefore that the approach is suited for an on board implementation on an airplane or a satellite where a limited amount of computational resources are available. The experimental evaluation has used as a test set data a set of AVIRIS hyperspectral images provided by NASA and it has shown that the compression algorithm performance is at the state of the art in its field and that the watermarking algorithm provides the desired security. All the above are discussed in details in the full paper in which we also provide an extended bibliography of related works.

UNDERSTANDING OF THE GEOMORPHOLOGICAL ELEMENTS IN THE DISCRIMINATION OF TYPICAL MEDITERRANEAN LAND COVER TYPES

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ABSTRACT

Quantification of geomorphometric features is the keystone concern of the current study. The quantification was based on the statistical approach in term of multivariate analysis of local topographic features. The implemented algorithm utilizes the Digital Elevation Model (DEM) to categorize and extract the geomorphometric features embedded in the topographic dataset. The morphological settings were exercised on the central pixel of 3x3 per-defined convolution kernel to evaluate the surrounding pixels under the right directional pour point model (D8) of the azimuth viewpoints. Realization of unsupervised classification algorithm in term of Iterative Self-Organizing Data Analysis Technique (ISODATA) was carried out on ASTER GDEM within the boundary of the designated study area to distinguish 10 morphometric classes. The morphometric classes expressed spatial distribution variation in the study area. The adopted methodology is successful to appreciate the spatial distribution of the geomorphometric features under investigation. The conducted results verified the superimposition of the delineated geomorphometric elements over a given remote sensing imagery to be further analyzed. Robust relationship between different Land Cover types and the geomorphological elements was established in the context of the study area. The domination and the relative association of different Land Cover types in corresponding to its geomorphological elements were demonstrated.

THE SYSTEM ARCHITECTURE DESIGN OF GEOLOGICAL ENVIRONMENTAL INFORMATION VERIFICATION SYSTEM FOR SITE SELECTION OF HLW DISPOSAL CANDIDATES

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ABSTRACT

The Korea Institute of Geoscience and Mineral Resources is developing a geological environmental information verification system to verify the reliability and transparency of the selection of HLW (High Level radioactive Waste) geological disposal candidates. The verification system can provide transparency and reliability through history management of geological environment information composed of rocks, mineral deposits, linear structures, faults, earthquakes, uplift / down throw, groundwater and geothermal information items. In this study, the basic data on the rocks and mineral deposits were constructed, and the system architecture design, history management and main function specification for the prototype system development of the geological environmental information verification system were written. In the case of rock mass information, the geological boundary inconsistency and stratigraphy name / erroneous description error were investigated for the existing geological map (1/250000 scale), and it was revised and supplemented. The information on the mineral deposits is collected by Korea Institute of Geoscience and Mineral Resources, Korea Resources Corporation, and Korea Mine Reclamation Corporation. The information is classified into coal, metal, and non - metal mines. The location information of the collected mines is converted to coordinates by using geocoding process. The unit mine cadastral map is composed of cells in which one cell is registered as a block with a grid of 1.50 km x 1.85 km horizontally / vertically. The mineral deposit information is intended to be used as an exclusion condition in the evaluation of geological disposal candidate sites, but further study on the mine development potential evaluation is necessary. The geological environmental information verification system will have not only metadata verification but also history management function for objective verification such as methodological / statistical verification. It is expected that the reliability and transparency of the geological environment information map used in the selection of candidates can be secured at the same time.

DEVELOPMENT OF AN INFORMATION-ANALYTICAL SYSTEM FOR THE MONITORING QUALITY OF GROUNDWATER

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ABSTRACT

Monitoring of groundwater quality based on automation and information technology is important to solve problems of groundwater protection. The goal of the research is to increase the effectiveness of environmental groundwater monitoring in the Republic of Kazakhstan by means of development of an information-analytical system for monitoring quantity and quality of groundwater and prediction potential risks associated with its condition. In order to monitor groundwater state for effective management, an information-analytical system for monitoring of quantity and quality of groundwater named "Ground Water" was developed. The system "Ground Water" has a client-server architecture with a centralized access to data located on a server. It carries out a timely and complex analysis of the state of groundwater in the regions of the Republic of Kazakhstan, produces reports based on the analysis of observed data, and visualizes modelling results of groundwater pollution. Centralized database "Underground Waters" of the State Data Bank of Subsoil of the Republic of Kazakhstan is data support system. It is formed on the data of the monitoring hydrogeological parties that operate in all regions of the Republic of Kazakhstan. The remote access to data is provided by means of secure Internet protocols. Based on methods of estimating of the state of groundwater and models of groundwater pollution, the system allows to evaluate the degree and scale of groundwater pollution and to identify zones of high environmental risk associated with the pollutants into the groundwater without conducting costly field experiments. This allows responding properly to high-risk situations associated with groundwater pollution.

THE SOFTWARE PACKAGE FOR MANAGEMENT OF MINERAL RESOURCES IN KOMTUM PROVINCE

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ABSTRACT

Mineral resourses in Kontum province in Central Highlands (Tay Nguyen) of Vietnam is very diversed with more than 500 mines. Yet, until 2015, the local government does not have all necessary database of the mineral resources of the province. The purpose of this research is to construct a Data - Tool Software Package for manegement of mineral resources in Kontum. The Data -Tool Software Package is composed of two parts. The first part of the package contains database of mineral resources in the province. The second part of the package is a management sofware with seven management functions. The Software Package was programmed in Visual basic langguage. The Software Package is approved and used by the Department of Resourses and Environment of Kontum to manage the provincal mineral resources.

IMPLEMENTATION OF INFORMATION RETRIEVAL USING TOUR ONTOLOGY IN GIS MOBILE ENVIRONMENT

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ABSTRACT

In the era of the fourth industrial revolution, ontology helps computer programs and humans share knowledge. It is also an important part of reasoning, which is the core of artificial intelligence solutions. Thus, I conducted research on a tour information retrieval system applying tour ontology methods in the GIS mobile environment Users want the most appropriate services in any location or environment regardless of the user's location or surrounding environment. If there are no services that meet the user's requirement in the existing service rule sets, it is necessary to generate a new service or to combine existing services. To provide these services, the attributes in each class in the ontology can be assigned through inference about serviceable contents. To provide useful information that a user wants in the current location exactly and precisely, I used the tour ontology to not only assign class relationships and attributes but to also appoint relationships of similar words or words with the same meaning. I also classified the tour information and then represented the information in the tour ontology. I describe the implementation environment. I constructed tour ontology applying attributes and relationships between each data set in a relational database. I used Protégé (ver. 4.0.2) to construct and infer the tour ontology database. Also, I represented the ontology using ontology language: OWL, RDF, and RDF/S. In addition, for the information retrieval in GIS environment,

A COMPARISON OF SATELLITE-BASED SEA ICE CONCENTRATIONS PRODUCTS

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ABSTRACT

Arctic is warming faster than other region, and a sharp retreat of sea ice is a signal of global climate change. The rapid change of Arctic climate affects rise of sea level and global ecosystem. To understand and predict global climate, monitoring of changes in Arctic sea ice is important. It is important to understand characteristics of sea ice data because there are various sea ice data. In this study, we compared SIC products applied different algorithms calculated from brightness temperature data during 1980-2010. Two algorithms that have been used for deriving sea ice concentration from passive microwave data were compared. One is EUMETSAT Ocean and Sea Ice Satellite Application Facilities (OSI SAF) reprocessed algorithm and the other is NASA Team algorithm. The difference between OSI SAF SIC and NASA Team SIC showed different consistency. In the time series analysis, the average of OSI SAF SIC was 0.85% overall higher than NASA Team. Seasonally, OSI SAF SIC was 0.48% in spring, 0.97% in summer, 1.38% in fall and 0.66% in winter higher than NASA Team SIC. We compared sea ice extent (SIE) as well. OSI SAF SIE was 425,000 km² overall higher than NASA Team SIE. By sea area, OSI SAF SIE was 198,000 km², 10,000 km² higher than NASA Team SIE in Arctic Ocean, Okhotsk Sea respectively. But in Lincoln Sea, OSI SAF SIE was 20,000 km² lower than NASA Team SIE. Despite brightness temperature data of the same sensor, seasonal and spatial differences were found according to SIC algorithms. Inconsistencies of difference suggest the need for validation studies.

DYNAMIC THRESHOLD DETERMINATION USING CORRELATION ANALYSIS BETWEEN 11? BRIGHTNESS TEMPERATURE AND 11-12? BRIGHTNESS TEMPERATURE DIFFERENCE FOR SEA-ICE DETECTION

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ABSTRACT

Sea-ice which affects the climate system, has been detected widely by satellite data and it have been studied for sea-ice detection using satellite data. As it have been distributed to middle and high-latitude region. The sea-ice detection method using satellite data is divided into two methods using reflectance and brightness temperature data. Among them, Ice Surface Temperature (IST) is used for detection of sea-ice through brightness temperature data. It requires the calculation of IST to perform sea-ice detection. In this study, we propose a simple and efficient method of sea-ice detection using the dynamic threshold value, which is omitted from the calculation process of IST. First, to determine the dynamic threshold, the correlation between MODIS 11? channel brightness temperature, the Brightness Temperature Difference (BTD: T11?-T12?) and MODIS IST was analyzed for pixels below the freezing point of the sea water. As a result of the correlation analysis, the three values showed a linear relationship, and the threshold was specified by using its relationship. In the clear sky which distributed by the MODIS Cloud Mask (MOD35), the sea-ice was detected by applying the MODIS 11? channel data. In addition, MODIS sea ice extent used to verify the performance of the sea-ice detection method of this study. As a result, Producer Accuracy (PA) showed high accuracy of more than 99%.

APPLICATIONS OF GEOMATICS IN SURFACE MINING

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ABSTRACT

In terms of method of extracting mineral from deposit mining can be classified into: surface, underground, and borehole mining. Surface mining is a form of mining, in which the soil and the rock covering the mineral deposits are removed. Types of surface mining include mainly strip and open-cast methods. As a term surface mining covers science associated with resource estimation and documenting deposits, development to create access to deposits and building of mine plant, extraction of minerals from deposits, mineral and waste processing, reclamation and new development of former mining grounds. At each stage of mining geodata describing changes occurring in space during the entire life cycle of surface mining project should be taken into consideration, i.e. collected, analysed, processed, examined, distributed. These data result from direct (e.g. geodetic) and indirect (i.e. remote or relative) measurements and observations including airborne and satellite methods, geotechnical, geological and hydrogeological data, and data from other types of sensors, e.g. located on mining equipment and infrastructure, mine plans and maps. Management of such vast sources and sets of geodata, as well as information resulting from processing, integrated analysis and examining such data can be facilitated with geomatic solutions. Geomatics is discipline of gathering, processing, interpreting, storing and delivering spatially referenced information. Thus, geomatics integrates methods and technologies used for collecting, management, processing, visualizing and distributing spatial data. In other words its meaning covers practically every method and tool from spatial data acquisition to distribution. In this work examples of application of geomatic solutions in surface mining on representative case studies in various stages of mine operation have been presented. These applications include: prospecting and documenting mineral deposits, assessment of land accessibility for potential large scale surface mining project, modelling mineral deposit (granite) management, concept of a system for management of conveyor belt network technical condition, project of a geoinformation system of former mining terrains and objects, and monitoring and control of impact of surface mining on mine surroundings with satellite radar interferometry.

PRELIMINARY RESULTS FOR LANDSAT 8-BASED SURFACE ALBEDO RETRIEVAL

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ABSTRACT

Albedo is a key component in the climate change studies. Since it is climate variables that balance absorption of solar energy, and its retrieval is important for climate change research. In order to efficiently use the retrieved surface broadband albedo data, long-term consistent periods and high spatial resolution are a key point. The objective of this paper is to retrieve surface broadband albedo which is consisent and high spatial resolution. Therefore we used Landsat 8 reflactance data as high spatial resolution. Addtionally, Landsat 7 surface broadband albedo is used for maintaining consistency of Landsat 8 albedo. First of all, consistency of Landsat 7 channel and Landsat 8 channel is analyzed. As a result, correlation coefficient(R) on each channel is over 0.90 and average of all channel is 0.96. We used multiple linear regression model using Landsat 7 surface broadband albedo and Landsat 8 reflectance channel data based on result of consistency analysis. Landsat 7 surface broadband albedo used this study is being used in many studies. We calculated regression coefficients of each channel by regression analysis, and it was used to derive a conversion formula which is the Landsat 8 reflectance channel data to surface broadband albedo. After we compared Landsat 8 surface broadband albedo calculated using the derived formula with Landsat 7 surface broadband albedo data, we used Root Mean Square Error (RMSE), R-square (R2) and bias to confirm consistency of two satellite. As a result, R2 is 0.89 and RMSE is 0.003 between Landsat 7 surface broadband albedo and Landsat 8 surface broadband albedo.

CLOUD DETECTION OVER SEA SURFACE WITH SPECTRAL LIBRARY USING HIMAWARI-8 DATA

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ABSTRACT

Cloud detection determine the cloud existence in each pixel and its can have an important impact on quality of surface and cloud-atmosphere applications. Cloud detection over ocean is requirement of retrieval sea surface temperature (SST) and understanding ocean circulation. But its statistical reliability are scarce as its limited spatial coverage for validation with ground-based data. In this paper, we present new cloud detection algorithm using spectral library for daytime himawari-8 data. First, spectral library is made as a function of Solar Zenith Angle (SZA) and Viewing Zenith Angle (VZA) at five degree intervals in the range 0~80° respectively using himawari-8 five spectral bands(0.46?(blue), 0.51? (green), 0.64? (red), 0.86? (VIS), 1.6? (NIR)) from March to October in 2016. The clear-sky pixels over ocean to make this library selected by Quality Level of SST from Himawari-8 data at NOAA Advanced Clear-Sky Processor for Ocean (ACSPO) SST system. Second, Dynamic Programming (DP) algorithm (Hiroaki and Seibi, 1978) is used. Originally, DP made for spoken word recognition by finding to optimal alignment in a speech pattern. In this paper, DP used to compare the validation by calculating minimized distance and with spectral library. Third, 0.86um Anomaly is used and its reflected cloud-free ocean homogeneous surface reflectance between five bands. And for glint-affected areas, we perfomed Correlation analysis using 11.2? brightness temperature and brightness temperature difference at 11.2 ? and 12.3?. Validation performed with the Quality Level of ACSPO H8 SST at 17th October 2016 06 UTC and the Probability of Detection (POD) is 85.22 and False-Alarm Rate (FAR) is 7.17.

ESTIMATING OF NET RADIATION IN URBAN AREA USING COMS DATA

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ABSTRACT

Net radiation is defined the total amount of radiant energy used as a heat source for earth circulation, such as evapotranspiration. And it balances with soil heat flux, sensible heat flux and latent heat flux. This is essential for understanding the energy distribution and hydrological cycle process of the surface at various scales. It is also possible to determine urban heat island phenomenon and urbanization trend by calculating and monitoring net radiation. For this, high spatial resolution and continuous net radiation computation is required to understand the energy distribution and circulation of the surface. In this study, we calculate and monitor the high resolution net radiation of the urbanization area of Eunpyeong in Republic of Korea using the Communication Ocean and Meteorological Satellite (COMS) data. The amount of insolation, which is the most influential factor in net radiation, must be calculated accurately first. The net radiation can be obtained by sum of the net short-wave and net long-wave radiation that contains insolation. The study period is 4 days from September 16th to 19th, 2014, which included cloudy weather. However, this is not suitable for continuous analysis of 1 year. Therefore, the study period of insolation is 1 year in 2014 for high accuracy in the case of net radiation. Insolation is calculated using COMS channel data and cloud detection analysis data. It is changed a spatial resolution of 30 m using the nearest neighbor method and performed Hemispherical Integration to the spatial extent equivalent to whole sky. And then daily composite and bias corrections are performed on insolation. The accuracy of estimated insolation is that Root Mean Square Error (RMSE) is 29.9408 Wm-2, Bias is -1.13983 Wm-2 in comparing with pyranometer data from 3 points. The trend of insolation is also comparable to observations. We calculate high resolution net radiation in urban areas using the estimated insolation, albedo data based on Landsat8, and air temperature data based on numerical model. As a result, there is showed sensitivity of RMSE 27.4071 is Wm-2, Bias 21.0251 is Wm-2. The daytime trends follow observed data, but night time trend is overestimated. Net radiation, where buildings, roads, and other artifacts are present, is high during the day, but low at night.

WATER STRESS MONITORING USING NDWI ANOMALY IN SOUTH KOREA

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ABSTRACT

The moisture content of the plant is one of the most important indicators of the plant's health is predictable through water stress monitoring. The Normalized Difference Water Index (NDWI) is useful for studying vegetation canopy moisture content, since it is related to the spectral characteristics according to the water content of the vegetation which is affected by the water stress. The purpose of this study is to determine the water stress in Korea Peninsula using NDWI for 15 years from 1999 to 2013 using SPOT/VEGETAION S10 channel data. The normalized anomalies of NDWI are used to identify the temporal changes in NDWI, and the local variation was removed to determine the moisture content at each point in time. Then, a Simple Moving Average (SMA) was performed to remove data noise and for intuitive spatial-time monitoring, NDWI anomaly were graded. To determine the moisture content, a water stress evaluation factor is defined by classifying NDWI anomalies as Low, Moderate and High. Low's anomaly range is -0.4 to -0.7, Moderate's range is -0.7 to -1 and High's range is under to -1. In here the higher grade means dry. We compare the NDWI anomalies with forest fire cases over an area of more than 150 ha which is enough scale for dry forest fire. As a result, during the study period, there are 24 cases of large-scale forest fire, at that the negative anomalies in these areas. When the NDWI anomaly grade is 'high', it can be confirmed that large forest fire occurs frequently. Therefor we consider NDWI can help to evaluate the water stress of forest canopy.

DESIGN AND IMPLEMENTATION WEBGIS FOR IMPROVING THE QUALITY OF EXPLORATION DECISIONS AT SIN-QUYEN COPPER MINE (NORTHERN VIETNAM)

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ABSTRACT

The objective of this study is to design and implement a WebGIS Decision Support System (WDSS) for reducing uncertainty and supporting to improve the quality of exploration decisions in the Sin-Quyen copper mine, northern Vietnam. The main distinctive feature of the Sin-Quyen deposit is an unusual composition of ores. Computer and software applied to the exploration problem have had a significant impact on the exploration process over the past 25 years, but up until now, no online system has been undertaken. The system was completely built on open source technology and the Open Geospatial Consortium Web Services (OWS). The input data includes remote sensing (RS), Geographical Information System (GIS) and data from drillhole explorations, the drillhole exploration data sets were designed as a geodatabase and stored in PostgreSQL. The WDSS must be able to processed exploration data and support users to access 2-dimensional (2D) or 3-dimensional (3D) cross-sections and map of drillhole exploration data and drill holes. The interface was designed in order to interact with based maps (e.g., Digital Elevation Model, Google Map, OpenStreetMap) and thematic maps (e.g., land use and land cover, administrative map, drillhole exploration map), and to provide GIS functions (such as creating a new map, updating an existing map, querying and statistical charts). In addition, the system provides geological cross-sections of ore bodies based on Inverse Distance Weighting (IDW), nearest neighbour interpolation and Kriging methods (e.g., Simple Kriging, Ordinary Kriging, Indicator Kriging and CoKriging). The results based on data available indicate that the best estimation method (of 26 drillhole exploration data sets) for estimating geological cross-sections of ore bodies in Sin-Quyen copper mine is Ordinary Kriging. The WDSS could provide useful information to improve drilling efficiency in mineral exploration and for management decision making.

GEOSPATIAL WEB SERVICES IN REAL ESTATE INFORMATION SYSTEM

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ABSTRACT

Since the data of cadastral records are of great importance for the economic development of the country, they must be well structured and organized. Records of real estate on the territory of Serbia met many problems in previous years. To prevent problems and to achieve efficient access, sharing and exchange of cadastral data on the principles of interoperability, domain model for real estate is created according to current standards in the field of spatial data. The resulting profile of the domain model for the Serbian real estate cadastre is based on the current legislation and on Land Administration Domain Model (LADM) which is specified in the ISO19152 standard. Above such organized data, and for their effective exchange, it is necessary to develop a model of services that must be provided by the institutions interested in the exchange of cadastral data. This is achieved by introducing a service-oriented architecture in the information system of real estate cadastre and with that ensures efficiency of the system. It is necessary to develop user services for download, review and use of the real estate data through the web. These services should be provided to all users who need access to cadastral data (natural and legal persons as well as state institutions) through e-government. It is also necessary to provide search, view and download of cadastral spatial data by specifying geospatial services. Considering that real estate contains geometric data for parcels and buildings it is necessary to establish set of geospatial services that would provide information and maps for the analysis of spatial data, and for forming a raster data. Besides the theme Cadastral parcels, INSPIRE directive specifies several themes that involve data on buildings and land use, for which data can be provided from real estate cadastre. In this paper, model of geospatial services in Serbia is defined. A case study of using these services to estimate which household is at risk of flooding using the Web Processing Service (WPS) spatial analysis is described.

3D VISUALIZATION OF URBAN AREA USING LIDAR TECHNOLOGY AND CITYGML

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ABSTRACT

3D models of urban areas have found use in modern world such as navigation, cartography, urban planning visualization, construction, tourism even in new applications of mobile navigation. With the advancement of technology there are much better solutions for mapping earth's surface and spatial objects. 3D city model enables exploration, analysis, management tasks and presentation of city. Urban areas are consisted of terrain surfaces, buildings, vegetation and other parts of city infrastructure such as city furniture. Nowadays there are a lot of different methods for collecting, processing and publishing 3D models of area of interest. In this study, main aim is to represent part of urban area of Novi Sad using LIDAR technology for data collecting, and different methods for extraction of geoinformation using CityGML as a standard for 3D representation. LIDAR technology is one of the most effective methods for collecting data due the large amount data that can be obtained with high density and geometrical accuracy. Bu using series of programs it is possible to process collected data, transform it to CityGML and store it in spatial database. Final product is CityGML 3D model which can display textures and colors in order to give a better insight of the cities. CityGML is open standard data model for storing alphanumeric and geometry attributes of city. There are 5 levels of display (LoD0, LoD1, LoD2, LoD3, LoD4). This paper shows results of first three levels of display. They are consisted of digital terrain model and buildings with differentiated rooftops and differentiated boundary surfaces. Complete model gives us a realistic view of 3D objects.

MODELLING OF THE GROUND SURFACE DISPLACEMENTS OBTAINED FROM PSINSAR TECHNIQUE ON THE URBAN AREA USING GIS TOOLS

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ABSTRACT

The PsInSAR technique processes a series of SAR images of the same area in diffenrent times. Persistend scatterers points (PS) which have stable phase and amplitude on all images are selected. The highest number of PS points are on urban areas, because they are mainly building objects.This techniques is suitable for detecting long-term slow ground surface dispalcements. Processing of SAR images and displacements modelling were performed for the area of Wroclaw agglomeration located in SW Poland.The research area is located in The Middle Odra Fault Zone that separates Fore-Sudetic Block from the Fore-Sudetic Monocline. For over dozen years, slow ground surface displacements have been determined using precision levelling and GNSS technique. Long-term vertical ground surface displacements are estimated at about 1 mm/year. Recent levelling measurements were made in this area in 2000 year, while GNSS measurements in 2010 year. The aim of the present research is determination of the changes after 2000 year on the basis of the available SAR images. On the long-term ground surface displacements caused by geological processes are superimposed displacements caused by local man-made factors. The main aims of modelling is elimination of PS points in the areas of expected local movements, the assessment the reliability of the displacements and the estimation of the long-term ground surface displacements component. The paper presents the main stages of the dispalacements modelling using GIS tools.

INVESTIGATION OF RELATIONSHIP BETWEEN URBANIZATION AND PROPERTY RIGHTS USING FRACTAL DIMENSION

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ABSTRACT

After the second half of 1950s, system approach has been widely used in planning studies. Chaos and Complexity theories are frequently used in the spatial analyses of cities with a chaotic and complex structure. The physical structure of cities is modeled with fractals repeating each other which are independent of the scale and have an irregular geometry. The main purpose of this paper is to investigate the relationship between ownership geometry and urbanization. In this context, the fractal dimension values of cadastral parcels, buildings and construction blocks were calculated using box-counting and integrated with population in GIS environment. The study area, Sivas city center which is located in Central Anatolia and is the Turkey's second largest province with a surface area of 28.480 km2 was examined. Unfortunately, no academic study on planning and land grading was encountered related to the province with such a big area. In this respect, the prepared paper has the distinction of being the first scientific study conducted in this field. The fractal dimension analysis method was preferred since it is easy to use and it allowed the investigation of the existing state and the urban macroform expected in the future. 1: 1.000 scaled digital cadastral data, administrative boundary data and plan data of 2015 were organized and used in GIS environment in the study. While the fractal dimension of the current situation was generated from cadastral data on the basis of the parcel, the fractal dimension values of the settlement areas to be built in the future were calculated from the construction blocks in the construction plan. According to the results, Sivas Province with a compact structure will maintain its structure in the future and expand to the southwest direction.

APPLICATION OF LANDSAT-8 AND ASTER DATA IN LITHOLOGICAL MAPPING OF PRECAMBRIAN BASEMENT ROCKS AT WADI MAARAFAWI AREA, SOUTH EASTERN DESERT OF EGYPT

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ABSTRACT

The exposed Precambrian basement rocks at Wadi Maarafawi area in the extreme eastern desert of Egypt comprise Abu Dahr ophiolitic serpentinites-talc carbonates rocks which were thrusted over Wadi Rahaba biotite and hornblende gneisses and island-arc metavolcanics. The whole sequence was intruded by syn to late tectonic intrusions including granodiorite-tonalite, gabbro and and monzogranite forming Gabal Maarafawi-El Farayid intrusions. The integrated remote sensing data of landsat-8 and ASTER including band rationing, principal components analysis (PC) and various ASTER indices have been used to discriminate and identify the exposed lithological units. The present study concluded that, the integrated processed remotely sensed data of Landsat-8 band ratio images and principal component PC (PC4, PC5, PC2) in addition to ASTER PC (PC2, PC6, PC5) are effective in discrimination most of the widely-exposed basement rock units in the study area. On the other hand, the various ASTER indices including; calcite, carbonate, kaolinite, clay and sericite-muscovite indices images successfully identified the different exposed rock units based on their enrichment with in some essential and secondary minerals. Based on the field investigation, petrographic study and the interpreted remote sensing data, a detailed lithological map for the study area has been produced.

GEO-INFORMATION TECHNOLOGY OF 8-LEVEL RESPONSIBILITY: CONCEPT AND STANDARD OF CONSTRUCTION MANAGEMENT FOR IMPLEMENTATION OF THE BIM-TECHNOLOGY IN RUSSIA

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ABSTRACT

Currently, the increase in construction efficiency in the world is associated with the introduction and development of information modeling of construction objects (BIM-technology). The BIM-technology is a process of collective creation and use of information about a structure that forms the basis for all decisions throughout the life cycle of an object. The BIM-technology with the help of a number of software products provides automation of production, it does not provide a methodology for the introduction of these products. The article describes the technology of 8-level responsibility, which is guaranteed to give systematically a new quality of management in construction, related to the requirements of the Russian Government Decree No. 87 of February 16, 2008. The technology of 8-level responsibility in the detailed specification of GD No. 87, (territory, construction stage, master plan object, section (part) of the project) extends the number of inseparable levels to 8 (part of the object, element, mark, position), where the "position" is the last indivisible detail of the object. There is reason to argue that the use of the "8LR Technology" in addition to the BIM-technology will provide a synergistic effect and will remove a number of obstacles to the BIM introduction in Russia and system control in the construction and operation of objects of any complexity in Russia.

CONTRIBUTION OF REMOTE SENSING FOR GEOLOGICAL STUDY OF THE SOUTH- EAST OF CONSTANTINE, NORTH OF THE ALGERIA

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ABSTRACT

The main objectives of this work are to map and characterize network of likely fractures to develop major deposits carbonated in the region. It is a contribution to a better knowledge of the geometry of existing surface fractures networks and their extension in subsurface. For this it appeals to the tool of remote sensing and seismic. Using remote sensing data, our study enabled us to draw up a card lineamentire, along with tectonic analysis, where we could list 409 lineaments divided into 9 classes according to their directions, among which: the main directions of the NW/SE fracturing are: H (N1300-N1500), G (N1100-N1300) and F (N900-N1100). These three classes are in agreement with the major flaws of the region, which are: the fault of Biskra-Outaya, Ouinet-Morsott-Tébessa and the dextres form. Of after the deferential work carried out on the South East Constantine area, and the results obtained by the seismic reflection, as well as the well data, summarizes our reservoirs are characterized by a mainly low to medium porosity and low permeability, these tanks are carbonated, and are affected by the majority of vulnerabilities detected on the surface, but these do not contribute to the improvement of the Petrophysical characteristics This can be reported to the clogging of the cracks.

DEPHOSPHORIZATION IRON ORE OOLITIC BY PYROMETALLURGICAL (GRILLING): CASE STUDY OF GARA DJEBILET DEPOSITS TINDOUF (ALGERIA)

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ABSTRACT

The iron ore deposit "Gara Djebilet" is one of the largest deposits of iron ore in Africa, with 3 billion tons of reserves, has not had adequate mineral processing studies, showing Sensitivity to finding an appropriate treatment method to reduce harmful levels of phosphorus As is mainly intended for the steel industry, the presence of phosphorus in the iron ore; Generates micro-cracks in the crystal lattice of iron after metallurgical melting, making the steel brittle and reaching the plasticity of the elasticity scene. The purpose of this study is to reduce impurity levels in iron ore, especially phosphorus to provide ore that meets the standards of quality as the requirements of steel producers. The ore processing method that has been proposed called roasting (roasting) for different degrees of temperature.

ANALYSIS BY THE RESIDUAL METHOD FOR ESTIMATE MARKET VALUE OF LAND ON THE AREAS WITH MINING EXPLOITATION IN SUBSOIL UNDER FUTURE NEW BUILDING

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ABSTRACT

This paper attempts to answer some of the following questions: what is the main selling advantage of a plot of land on the areas with mining exploitation? which attributes influence on market value the most? and how calculate the mining influence in subsoil under future new building as market value of plot with commercial use? This focus is not accidental, as the paper sets out to prove that the subsoil load bearing capacity, as directly inferred from the local geotechnical properties with mining exploitation, considerably influences the market value of this type of real estate. Presented in this elaborate analysis and calculations, are part of the ongoing development works which aimed at suggesting a new technology and procedures for estimating the value of the land belonging to the third category geotechnical. Analysed the question was examined both in terms of the theoretical and empirical. On the basis of the analysed code calculations in residual method, numerical, statistical and econometric defined results and final conclusions. A market analysis yielded a group of subsoil stabilization costs which depend on the mining operations interaction, subsoil parameters, type of the contemplated structure, its foundations, selected stabilization method, its overall area and shape.

EFFECTIVENESS OF MINERAL WASTE MANAGEMENT

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ABSTRACT

The process of deposit exploitation and further processing of the extracted raw materials is accompanied by waste generation and their disposal on the ground surface or in mine workings. Mineral waste are the side effect of basic production processes used in the mineral industry, in order to obtain useful substances. In the case of metals, first of all, it involves main production lines, encompassing ore extraction and treatment as well as metallurgy. Flotation waste in ore treatment processes and slags in metallurgical processes are especially large in quantity. Waste constitute a large burden for the environment, and especially for the natural environment. Companies make appropriate payments for pollutant emissions and waste disposal to the State Treasury. According to the EU directive it is necessary to reduce the amounts of waste generated and to seek for opportunities of their economic utilization. Implementation of effective methods for the use of waste is one of the priorities, leading to the measurable economic and environmental effects. In this paper the effectiveness of mineral waste minimization was examined in three dimensions: advisability of useful component recovery, management methods and appropriateness of incurring investment expenditure. Taking the above into consideration, four effectiveness models were analysed in terms of waste management in basic processes, technologically linked with mineral components recovery and without mineral components recovery as well as utilization of waste for making new products, technologically linked with mineral components recovery, and without mineral components recovery. The new calculation algorithms for all models mentioned above have been developed.

APPROPRIATELY ADAPTING SUPPLY FOR FAST MOVEMENT OF HYDRAULIC SUPPORTS IN HIGH-EFFICIENCY COAL MINE WORKING FACES

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ABSTRACT

In coal mining, the speed at which hydraulic supports can be moved influences the production efficiency of a fully mechanized workface. An emulsion pump station supplies the hydraulic power and drives the hydraulic support actions. Fast movement of supports demands an adequate hydraulic supply, so research into optimizing the supply of the emulsion pumps aims to improve the performance of the coal workface hydraulic system. An ideal hydraulic supply should comprehensively evaluate the support movement speed (provide adequate flow), the hydraulic component lifetime (provide stabilized pressure), and energy conservation (supply appropriate power). This study focuses on the characteristics of various support actions to determine optimal conditions for the support actions and the hydraulic supply. To predict the appropriate flow supply, a back-propagation neural network regression model was built, based on mathematical analysis of the optimization process. The experimental data confirm the prediction accuracy of the model. Comparison between an appropriately adapting supply and a constant supply proves that the former not only ensures faster movement of the support, but also reduces system pressure fluctuations and energy consumption.

DETERMINATION OF PARTICULAR ENDOGENEOUS FIRES HAZARD ZONES IN GOAF WITH CAVING OF LONGWALL

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ABSTRACT

Hazard of endogenous fires is one of the basic and common presented occupational safety hazards in coal mine in Poland and in the world. This hazard means possibility of coal self-ignition as the result of its self-heating process in mining heading or its surrounding. In underground coal-mining during ventilating of operating longwalls takes place migration of parts of airflow to goaf with caving. In a case when in these goaf a coal susceptible to self-ignition occurs, then the airflow through these goaf may influence on formation of favorable conditions for coal oxidation and subsequently to its self-heating and self-ignition. Endogenous fire formed in such conditions can pose a serious hazards for the crew and for continuity of operation of mining plant. From the practical point of view a very significant meaning has determination of the zone in the goaf with caving, in which necessary conditions for occurenceoccurrence of endogenous fire are fulfilled. In the real conditions determination of such a zone is practically impossible. Therefore Authors of paper developed a methodology of determination of this zone basing on the results of modeling tests. This methodology includes a development of model of tested area, determination of boundary conditions and carrying out the simulation calculations. Based on the obtained results particular hazardous zone of endogenous fire is determined. A base for development of model of investigated region and selection of boundary conditions are the results of real tests. In the paper fundamental assumption of developed methodology, particularly in a range of assumed hazard criterion and sealing coefficient of goaf with caving were discussed. Also a mathematical model of gas flow through the porous media was characterized. Example of determination of a zone particularly endangered by endogenous fire for real system of mining heading in one of the hard coal mine was presented. Longwall ventilated in the "Y" system was subjected to the tests. For determined mining-geological conditions, the critical value of velocity of airflow and oxygen concentration in goaf, conditioning initiation of coal oxidation process were determined. For calculations ANSYS Fluent software based on finite volume method, which enable very precisely to determine the physical and chemical air and parameters at any point of tested mining heading and goaf with caving was used. Such precisely determination of these parameters on the base of the test in real conditions is practically impossible. Obtained results allowed to take early proper actions in order to limit the occurrence of endogenous fire. One can conclude, that presented methodology creates great possibilities of practical application of modeling tests for improvement of the occupational safety state in mine.

PRODUCTION OF COPPER AS A COMPLEX MINING AND METALLURGICAL PROCESSING SYSTEM IN POLISH COPPER MINES OF THE LEGNICA-GLOGÓW COPPER BELT

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ABSTRACT

Geological and technological conditions of Cu production in the Polish copper mines of the Legnica-Glogów Copper Belt (LGOM) are presented. Cu production is recognized as a technological fractal consisting of ubsystems for mineral exploration, ore extraction and processing, and metallurgical processing. Qualitative and quantitative models of these operations have been proposed, including estimation of their running costs. Simulation calculations of such a system have been performed, which allow for optimization of the system parameters according to economic criteria under variable Cu mineralization in the body ore deposit. The main objective of the study is to develop independent forecasting tools for analysis of production efficiency in domestic copper mines based on available sources of information. Such analyzes are primarily of social value, allowing for assessment of the efficiency of management of local mineral resources in the light of current technological and market constraints. The calculations show that there is a large convergence of forecasts with actual production results, and the method used allows for estimation of the optimum range of metal concentrations in the ore deposit profile at which the lowest production costs are obtained.

THE FRAGMENT SIZE DISTRIBUTION OF BLASTED ROCK MASS

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ABSTRACT

Rock mass is a heterogeneous material, and the heterogeneity of rock causes sizes distribution of fragmented rocks in blasting. Prediction of blasted rock mass fragmentation has a significant role in the overall economics of opencast mines. Blasting as primary fragmentation can significantly decrease the cost of loading, transport, crushing and milling operations. Blast fragmentation chiefly depends on the specific blast design (geometry of blast holes drilling, the quantity and class of explosive, the blasting form, the timing and partition, etc.) and on the properties of the rock mass (including the uniaxial compressive strength, the rock mass elastic Young modulus, the rock discontinuity characteristics and the rock density). Prediction and processing of blasting results researchers can accomplish by a variety of existing software's and models, one of them is the Kuz-Ram model, which is possibly the most widely used approach to estimating fragmentation from blasting. This paper shows the estimation of fragmentation using the "SB" program, which was created by the authors. Mentioned program includes the Kuz-Ram model. Models of fragmentation are confirmed and calibrated by comparing the estimated fragmentation with actual post-blast fragmentation from image processing techniques. In this study, the Kuz-Ram fragmentation model has been used for an open-pit limestone quarry in Dalmatia, southern Croatia. The resulting calibrated value of the rock factor enables the quality prognosis of fragmentation in further blasting works, with changed drilling geometry and blast design parameters. It also facilitates simulation in the program to optimize blasting works and get the desired fragmentations of the blasted rock mass.

ANALYSIS OF INFLUENCE OF GOAFS SEALING FROM TAILGATE ON THE METHANE CONCENTRATION AT THE OUTLET FROM THE LONGWALL

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ABSTRACT

One of the most common and most dangerous gas hazards in undeground coal mine is methane hazard. Formation of dangerous, explosive concentrations of methane occurs the most often in the region of crossing of longwall with the ventilation gallery. Particularly it applies to longwalls ventilated in "U from bounds" system. Outflow of gases from the goaf to the tailgate takes place through the boundary surfaces of this sidewalk with goaf. Main cause of this process is a phenomenon of air filtration through the goaf with caving. This filtration is a result of migration of the part of ventilation air stream supplied to the longwall. This air is released into the goaf on the entire longwall length, however its greater amount gets to the goaf with caving space at the crossing of maingate with exploitation longwall. However, the biggest outflow of air mixture and gases from the goaf occurs in top gate in upper corner of the longwall. This is a result of pressure difference in this region. This phenomenon causes that to the space of heading besides the air also other gases present in the goaf, mainly methane, are released. Methane is an explosive gas. Most often boundaries of explosive mixtures of methane, air and inert gases are described by the so-called. Coward triangle explosion. Within the limits of the occurrence of the concentration of explosive methane explosion initials may be endogenous fire, blasting or sparks arising from friction of moving lumps of rock. Therefore, in order to decrease its concertation in this region, by limiting its outflow from the goaf with caving different actions are taken. One of such action is sealing of goaf from top gate side. Analysis of impact of sealing of these goaf on the methane concentration at the outlet of longwall is main aim of studies researches, which results are presented in the paper. Model of tested region, together with boundary conditions (including parameters of flowing air and the methane content) was developed on the base of real data from one of the exploitation longwalls. In the studies it was assumed that measurement of sealing of goaf (their isolation) will be permeability coefficient of sealing layer. Based on this impact of this coefficient value on methane concertation at outlet from the longwall was determined. As a result of performed analysis also other physical parameters of air stream flowing through the tested region were determined, also dependent on the degree of sealing of goaf. Simulation tests were carried out with use of finite volume method. Obtained results clearly indicate, that by a proper selection of degree of sealing of goaf with caving, one can have significant influence on the air stream parameters in the region of upper corner of longwall.

ANALYSIS OF AVAILABILITY OF LONGWALL-SHEARER BASED ON ITS WORKING CYCLE

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ABSTRACT

Effective use of any type of devices, particularly machines has very significant meaning for mining enterprises. High costs of their purchase and tenancy cause that these enterprises tend to the best use of own technical potential. However, characteristics of mining production causes that this process not always proceeds without interferences. Practical experiences show that determination of objective measure of utilization of machine in mining company is not simple. In the paper methodology allowing to solve this problem is presented. Longwall-shearer, as the most important machine between longwall mechanical complex. Also it was assumed that the most significant meaning for determination of effectiveness of longwall-shearer has its availability, i.e. its effective time of work related to standard time. Such an approach is conforming with OEE model. However, specification of mining branch causes that determined availability do not give actual state of longwall-shearer's operation. Therefore this availability was related to the operation cycle of longwall-shearer. In presented example a longwall-shearer works in unidirectional cycle of mining. It causes that in one direction longwall-shearer mines, moving with operating velocity, and in other direction it does not mine and moves with maneuver velocity. Such defined working cycle became a base for determinate availability of longwall-shearer. Using indications of industrial automatic system for each of working shift there were determined number of cycles of longwall-shearer and availability of each one. Accepted of such way of determination of availability of longwall-shearer enabled to perform accurate analysis of losses of its availability. These losses result from non-planned shutdowns of longwall-shearer. Thanks to performed analysis based on the operating cycle of longwall-shearer time of its standstill for particular phase of cycle were determined. Presented methodology of determination of longwall-shearer's availability enables to obtain information which may be used for optimization of mining process. Knowledge of particular phases of longwall-shearer's operation, in which reduced availability occurs, allows to direct the repairing actions exactly to these regions. Developed methodology and obtained results create great opportunities for practical application and improvement of effectiveness of underground exploitation.

This article is the result of the research project No. PBS3/B6/25/2015 "Application of the Overall Equipment Effectiveness method to improve the effectiveness of the mechanized longwall systems' work in the coal exploitation process" realized in 2015-2017, financed by NCBiR.

APPLICATION OF ELEMENTS OF TPM STRATEGY FOR OPERATION ANALYSIS OF MINING MACHINE

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ABSTRACT

Total Productive Maintenance (TPM) strategy includes group of activities and actions in order to maintenance machines in failure-free state and without breakdowns thanks to tending limitation of failures, non-planned shutdowns, lacks and non-planned service of machines. These actions are ordered to increase effectiveness of utilization of possessed devices and machines in company. Very significant element of this strategy is connection of technical actions with changes in their perception by employees. Whereas fundamental aim of introduction this strategy is improvement of economic efficiency of enterprise. Increasing competition and necessity of reduction of production costs causes that also mining enterprises are forced to introduce this strategy. In the paper examples of use of OEE model for quantitative evaluation of selected mining devices were presented. OEE model is quantitative tool of TPM strategy and can be the base for further works connected with its introduction. OEE indicator is the product of three components which include availability and performance of the studied machine and the quality of the obtained product. The paper presents the results of the effectiveness analysis of the use of a set of mining machines included in the longwall system, which is the first and most important link in the technological line of coal production The set of analyzed machines included the longwall shearer, armored face conveyor and cruscher. From a reliability point of view, the analyzed set of machines is a system that is characterized by the serial structure. The analysis was based on data recorded by the industrial automation system used in the mines. This method of data acquisition ensured their high credibility and a full time synchronization. Conclusions from the research and analyses should be used to reduce breakdowns, failures and unplanned downtime, increase performance and improve production quality

This article is the result of the research project No. PBS3/B6/25/2015 "Application of the Overall Equipment Effectiveness method to improve the effectiveness of the mechanized longwall systems' work in the coal exploitation process" realized in 2015-2017, financed by NCBiR.

FORECASTING OF ENERGY EXPENDITURE OF INDUCED SEISMICITY WITH USE OF ARTIFICIAL NEURAL NETWORK

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ABSTRACT

Coal mining in many Polish mines in the Upper Silesian Coal Basin is accompanied by high levels of induced seismicity. In mining plants, the methods of shock monitoring are improved, allowing for more accurate localization of the occurring phenomena and determining their seismic energy. Equally important is the development of ways of forecasting seismic hazards that may occur while implementing mine design projects. These methods, depending on the length of time for which the forecasts are made, can be divided into: long-term, medium-term, short-term and so-called. alarm. Long-term forecasts are particularly useful for the design of seam exploitations. The paper presents a method of predicting changes in energy expenditure of shock using a properly trained artificial neural network. This method allows to make long-term forecasts at the stage of the mine's exploitation design, thus enabling the mining work plans to be reviewed to minimize the potential for tremors. The information given at the input of the neural network is indicative of the specific energy changes of the elastic deformation occurring in the selected, thick, resistant rock layers (tremor-prone layers). Energy changes taking place in one or more tremor-prone layers are considered. These indicators describe only the specific energy changes of the elastic deformation accumulating in the rock as a consequence of the mining operation, but does not determine the amount of energy released during the destruction of a given volume of rock. In this process, the potential energy of elastic strain transforms into other, non-measurable energy types, including the seismic energy of recorded tremors. In this way, potential energy changes affect the observed induced seismicity. The parameters used are characterized by increases (declines) of specific energy with separation to occur before the hypothetical destruction of the rock and after it. Additional input information is an index characterizing the rate of tectonic faults. This parameter was not included in previous research by authors. At the output of the artificial neural network, the values of the energy density of the mining tremors [J/m3] are obtained. An example of the predicted change in seismicity induced for a highly threatened region is presented. Relatively good predicted and observed energy expenditure of tremors was obtained. The presented method can complement existing methods (analytical and geophysical) forecasting seismic hazard. This method can be used primarily in those areas where the seismic level is determined by the configuration of the edges and residues in the operating seam, as well as in adjacent seams, and to a lesser extent, the geological structure of the rock. The method is local, what means that the artificial neural network prediction can only be performed for the region from which the data used for its learning originated. The developed method cannot be used in areas where mining is just beginning and it is not possible to predict the level of seismicity induced in areas where no mining tremors have been recorded so far.

ANALYSIS OF GEODYNAMICAL CONDITIONS OF BURNING COAL WASTE DUMPS LOCATION

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ABSTRACT

Spontaneous combustion of coal waste dumps and their impact on the environment of mining regions remain important environmental problem, in spite of the measures that are being taken. The paper presents the hypothesis, which states that the location of coal waste dumps at the boundaries of geodynamically active crust blocks promotes the appearance of conditions for their spontaneous combustion. At present geodynamically active crust faults that affect the operating conditions of engineering facilities are observed not only in the areas of tectonic activity, but also on platforms. According to the concept of geodynamical zoning, geodynamically dangerous zones for engineering structures can be not only large, well-developed crust faults, but also just formed fractures that appear as boundaries of geodynamically impacting and hierarchically ordered crust blocks. The purpose of the study is to estimate the linkage of burning dumps to boundaries of geodynamically active crust blocks (geodynamically dangerous zones) for subsequent development of recommendations for reducing environmental hazard. The analysis of 27 coal waste dumps location was made for one of the Eastern Donbass regions (Russia). Nine of sixteen burning dumps are located in geodynamically dangerous zones, which, taking into account relatively small area occupied by all geodynamically dangerous zones, results that there is a concentration (pcs/km2) of burning dumps here, which is 7 times higher than the baseline value. While the probability of accidental obtaining of such a result is extremely low, this can be considered as the evidence of the linkage of burning dumps to geodynamically dangerous zones. Taking into account the stressed state of the rock massif in this region, all geodynamically dangerous zones can be divided into compression and tension zones. The statistic is limited, but nevertheless in tension zones the concentration of burning dumps is 1.7 times higher than in compression zones. Available results of thermal monitoring of burning dumps in this region also show that linearly extended firing sources oriented along geodynamically dangerous zones are observed. The obtained results show that geodynamical conditions of mining region, in which coal waste dumps are located, is important factor that impacts the creation of conditions for their spontaneous combustion and subsequent impact on the environment. Then this factor should be controlled by choosing the place for dumps location. It is proposed to carry out these works for the entire mining region of the Eastern Donbass, where there are more than 200 coal dumps.

A STUDY OF SELECTED COMPOSITES COPPER CONCENTRATE-PLASTIC WASTE USING THERMAL ANALYSIS

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ABSTRACT

The paper presents thermal analysis of selected composites (copper concentrate, plastic waste) in two stages. The first stage consisted in thermogravimetric analysis and differential thermal analysis on the applied plastic waste and copper concentrate, and subsequently, a comparative study has been carried out on products obtained, constituting composites of those materials. As a result of analyses, it was found that up to ca. 400 oC composites show high thermal stability, whereas above that temperature, a thermal decomposition of the composite occurs, resulting in emissions of organic compounds, i.e. hydrocarbon compounds and organic oxygenate derivatives.

A STUDY OF METAL-HUMIC CATALYSTS BEFORE AND AFTER THE GAS DESULPHURIZATION PROCESS USING THERMAL ANALYSIS

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ABSTRACT

The study of metal-humic catalysts before and after the SO2 conversion has been carried out using thermal analysis. The thermogravimetric analysis and differential thermal analysis has been carried out using Perkin-Elmer TGA 7 and DTA 7 equipment in an argonic atmosphere. The heating rate of samples in the DTA was 10 °C/min., and in the TGA 40 °C /min. The following catalysts have been chosen for analysis: H-Pb2+/450 °C, H-B/450 °C, H-Sn2+/450 °C, H-Ce 4+. The study of metal-humic catalysts using thrmal analysis has shown that, in the DTA curves of studied catalysts before SO2 conversion, endothermic peaks related to decomposition of metal carbonates, melting of metals or decomposition of metal-humic bonding. In the DTA curves after the SO2 conversion process, there are additional endothermic peaks related to the presence of sulfur in the metal-humic compounds and to thermal decomposition of those bonds.

STUDIES OF THE DURABILITY OF BELT CONVEYOR IDLERS WITH WORKING LOADS TAKEN INTO ACCOUNT

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ABSTRACT

For many previous years researchers from the Machinery Systems Division of Wroclaw University of Science and Technology has been conducting research into determining the effective lifetime of idlers in variable operating conditions. Idlers are one of the key component of every belt conveyor which generate significant part of total resistance to motion of belt conveyor. Belt conveyor downtimes due to idlers failures or service cause decrease in belt conveyor's effectiveness and additional cost. Moreover, downtime of a single belt conveyor often forces the stop of entire branch of transportation network feeding it. The paper presents the results of laboratory and operational studies conducted in the Machinery Systems Division of Wroclaw University of Science and Technology in recent years which have become the basis for selecting proper design solutions for belt conveyor idlers co they can be optimized for specific strength and operational criteria. The usefulness of the results for assessing the energy intensity of idlers, estimating their durability and determining modernization policies has been confirmed. Methods of estimating the durability of carrying idlers on the basis of the identified output stream distributions are presented. Results of studies carried out using an analytical method and a laboratory method are reported. It has been shown that the operational durability of a roller is determined by its design, the idler set parameters (the spacing and the angle of bevel) and the operating conditions having a bearing on the irregularity of the transported output stream. Presented research are very actual nowadays due to increasing demand for belt conveyors which are characterized by energy efficiency and durability.

NEW QUALITY STANDARDS OF TESTING IDLERS FOR HIGHLY EFFECTIVE BELT CONVEYORS

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ABSTRACT

The paper presents results of research and analyses carried out into the belt conveyors idlers' rotational resistance which is one of the key factor indicating the quality of idlers. Moreover idlers' rotational resistance is important factor in total resistance to motion of belt conveyor. The evaluation of the technical condition of belt conveyor idlers is carried out in accordance with actual national and international standards which determine the methodology of measurements and acceptable values of measured idlers' parameters. Requirements defined by the standards, which determine the suitability of idlers to a specific application, despite the development of knowledge on idlers and quality of presently manufactured idlers maintain the same level of parameters values over long periods of time. Nowadays the need to implement new, efficient and economically justified solution for belt conveyor transportation systems characterized by long routes and energy-efficiency is often discussed as one of goals in belt conveyors' future. One of the basic conditions for achieving this goal is to use only carefully selected idlers with low rotational resistance under the full range of operational loads and high durability. Due to this it is necessary to develop new guidelines for evaluation of the technical condition of belt conveyor idlers in accordance with actual standards and perfecting of existing and development of new methods of idlers testing. The changes in particular should concern updating of values of parameters used for evaluation of the technical condition of belt conveyor idlers in relation to belt conveyors' operational challenges and growing demands in terms of belt conveyors' energy efficiency.

TENSILE/CREEP TEST SPECIMEN PREPARATION PRACTICES OF SURFACE SUPPORT LINERS

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ABSTRACT

Ground support has always been considered as a challenging issue in all underground operations. Many forms of support systems and supporting techniques are available in the mining/tunnelling industry. In the last two decades, a new polymer based material, Thin Spray?on Liner (TSL), has attained a place in the market as an alternative to the current areal ground support systems. Although TSL provides numerous merits and has different application purposes, the knowledge on mechanical properties and performance of this material is still limited. In laboratory, since tensile rupture is the mostly observed failure mechanism in field applications, researchers have generally studied the tensile testing of TSLs with modification of American Society for Testing and Materials (ASTM) D-638 standards. For tensile creep testing, same standard is also followed during the specimen preparation process in this study. Two different specimen dimension types (Type I, Type IV) are widely preferred in TSL tensile testing according to standards. Moreover, moulding and die cutting techniques are commonly used specimen preparation techniques. In literature, there is a great variability of test results due to the difference in specimen preparation techniques and practices. In this study, a ductile TSL product was tested in order to investigate the effect of both specimen preparation techniques and specimen dimensions under 7-day curing time. As a result, ultimate tensile strength, tensile yield strength, tensile modulus, and elongation at break values were obtained for 4 different test series. It is concluded that Type I specimens have higher strength and modulus values compared to Type IV specimens and moulded specimens have lower results than that of prepared by using die cutter. Moreover, specimens prepared by moulding techniques have scattered test results. Type IV specimens prepared by die cutter technique are suggested for preparation of tensile or tensile creep test specimens for TSL testing.

DEVELOPMENT OF TEST RIG FOR ROBOTIZATION OF MINING TECHNOLOGICAL PROCESSES - OVERSIZED ROCK BREAKING PROCESS CASE

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ABSTRACT

In underground mines where ore is exploited using room-and-pillar system, production process is realized using self-propelled machines. Blasted ore is transported with load-haul-dump machines (LHD) to dumping points, where it is transferred onto horizontal transportation assets - conveying system. The objective of dumping points with grille is primary classification of the material (into coarse and fine material) and breaking oversized rocks with hydraulic hammer. Current challenges for the underground mining include e.g. safety improvement as well as production optimization related to bottlenecks, stoppages and operational efficiency of the machines. As a first step, remote control of the hydraulic hammer has been introduced, which not only transferred the operator to safe workplace, but also allowed for more comfortable work environment and control over multiple technical objects by a single person. Today literature analysis shows that current mining industry around the world is oriented to automation and robotization of mining processes and reveals technological readiness for 4th industrial revolution. The paper is focused on preliminary analysis of possibilities for the use of the robotic system to rock-breaking process. Research has been carried out on the test rig using many simplified assumptions in comparison with real object. Finally, algorithm for rock breaking station has been developed and tested, what leads to define further directions of development.

PRELIMINARY RESEARCH ON POSSIBILITIES OF DRILLING PROCESS ROBOTIZATION

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ABSTRACT

Nowadays, drilling & blasting is only practical means of deposit excavation common using in hard rock mining. Negative influence of explosives usage on safety issues of underground mine is a main cause of mining demands related to elimination of people from production area. Other aspects worth taking into consideration are drilling precision according to drilling pattern, blasting effectiveness, improvement of drilling tool reliability etc. In the literature different drilling support solutions are well-known in terms of positioning support systems, anti-jamming systems or cavity detection systems. For many years, drill teleoperation is also developed. Unfortunately, available technologies have so far not fully met the industries expectation in hard rock. Mine of the future is expected to incorporate robotic system instead of current approaches. In this paper we present preliminary research related to robotization of drilling process and possibilities of its application in underground mine condition. Research has been carried out on the test rig using many simplified assumptions in comparison with real object. As a result, algorithms for automation of drilling process have been proposed and tested on the test rig. Experiences gathered so far underline that there is a need for further developing robotic system for drilling process.

OPTIMIZATION OF A MINING PROJECT FOR ENGINEERING AND FINANCIAL UNCERTAINTIES

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ABSTRACT

We present an interdisciplinary simulation study for optimizing resource extraction in a dependent 2-dimensional macro space of financial and engineering options. Our work is motivated by the naïve treatment of costs and their derivatives in most of the resource extraction literature albeit their crucial role for operational decision-making and planning. Leaning on experiences from a university-industry linked 3-year project (2012-2015) with BHP Billiton, in which all three contributors to this paper have been enganged, we model the company's Olympic Dam, Australia, extension project using publicly available data only. Our methodology is statistical activity cost analysis (SACA) with which we model (Monte Carlo simulations) the mutual influence of financial and engineering components of activities in a planned mining project (the ore extraction value chain), their uncertainties and the associated risks. Our results focus on a crucial performance indicator, throughput, and how financial boundaries influence throughput at the mine level. In more general terms, we demonstrate how our holistic modelling across stylized excavation activities (ore body estimation, drilling and blasting, hauling, and grinding and crushing) yields global solutions that are more efficient than concatenating autonomous local solutions from each activity. Our results are appealing for research and practice alike. For research, we hope to stimulate further interdisciplinary collaborations to advance analysis of the complex mining system. For practice, our work gives the rational decision maker a testing platform with which expected profitability margins and project feasibility can be reviewed and strategies defended.

CONDITION BASED CONVEYOR BELT REPLACEMENT STRATEGY IN LIGNITE MINES WITH RANDOM BELT DETERIORATION

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ABSTRACT

In Polish lignite surface mines condition based belt replacements strategies are applied in order to assure profitable refurbishment of worn out belts by external firm specializing in belt maintenance. In two of three lignite mines, staff asses belt condition subjectively during visual inspections. Only one mine applies specialized diagnostic device (HRDS) allowing on objective magnetic evaluation of belt core condition in order to choose the most profitable moment for worn out belt segments dismantling from conveyors and sending them to the maintenance firm providing their refurbishment. Advantages of new diagnostic device called DiagBelt are described. It was developed at the Faculty of Geoengineering, Mining and Geology, at Wroclaw University of Science and Technology. Economic gains from its application are calculated for the lignite mine and for the belt maintenance firm taking into account random life (durability) of new and reconditioned belts (after the 1st and the 2nd refurbishment). Recursive calculations for following years allows on estimation of the length and costs of replaced, reconditioned and purchased belts on annual basis and Monte Carlo method was used to estimate their variability caused by random deterioration of belts. Savings are obtained due to better selection of moments (times) for belt segments replacements and possibility to qualify worn out belts for refurbishment without need to remove their covers. In effect increased belts durability and lowered share of wasted belts (which were not qualified for recondition) creates savings which can quickly cover expenditures on new diagnostic tools and regular belt inspections in the mine.

RANDOM DETERIORATION PROCESS OF CONVEYOR BELT EVALUATED BY STATISTICAL ANALYSIS OF CORE FAILURES DETECTED ALONG BELT AXIS AND ELAPSED TIME

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ABSTRACT

Magnetic diagnostic methods are used for steel cord belt condition evaluation since the beginning of 1970s. Initially they generated an analog signal for several tens of centimeters of conveyor belts scanned sequentially with one measuring head in several cycles or the whole width of the belt at one time thanks to the installation of many measuring heads across the entire cross section. This did not allow identification of single centimeter failures, but rather an aggregate assessment of the state of quite wide band. Modern diagnostic devices, thanks to miniaturization, allow up to 200 heads per belt width (eg. DiagBelt system) to identify damage of individual cords. Instead of analogue signals, they generate a zero-one digital signal corresponding to a change in the magnetic field sign, which can illustrate damage on 2D images. This makes it easier to identify the location and size of the damage in the belt image. Statistical analysis of digital signals summed up for consecutive sections along the belt axis allows to present both the source signal and its aggregation for band of a given width to form aggregate measures of belt damage such as the damage density per 1 meter of belt. Observation of changes in these measurements at different times allows on evaluation of its rate of change over time, which can be used to forecast future belt condition and to select the proper moment of preventive belt replacement to another one to avoid emergency downtimes (eg in underground mines) or to recondition of belts (eg. in lignite surface mines). The paper presents the results of investigations of the damage condition of a core of a single belt segment working in one of the copper ore underground mines. Scanning of the belt condition was performed few times at intervals of several months. The paper presents the results of the analysis of the changes in core condition, showing the random character of the damage process along the axis and its change over time.

3D OREBODY MODELLING OF HEKIMHAN-DEVECI IRON DEPOSIT

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ABSTRACT

As in many other industries, the main concerns of the modern mining industry are with the source and cost of finance for developing new projects, as well as ensuring a profitable cash flow on existing operations. Meeting these concerns depends on successful technical and financial planning of mining projects. The fundamental starting point for such studies is to determine the characteristics of the mineral deposit to be exploited. This is achieved through geological modelling of the three-dimensional (3D) shape and properties of the materials present in mineral deposits, and the presentation of results in a form which is accessible to mine planning engineers. In recent years the application of interactive graphics software, offering 3D database handling, modelling and visualization, has greatly enhanced the options available for predicting the subsurface limits and characteristics of mineral deposits. The aim of this study is to estimate reserve and quality distribution of Fe% and Mn%, in Hekimhan-Deveci (Malatya-Turkey) Iron Deposit by creating 3D orebody model and to emphasize the importance of Deveci Siderite reserves for the Turkish iron and steel industry, In this regard, Deveci reserve has been examined by Kriging method, one of the jeostatistical methods. Considering the analysis results on the existing state of its Mn content, Deveci reserve is estimated to have enough capacity to meet the low-content-iron-ore need of Turkish iron and steel industry. As a further result, it can be said that computer applications can ensure more accurate, precise and timely geological predictions thus facilitating optimum technical and financial planning of the exploitation of mineral deposits.

ESTIMATION OF THE MINING ECONOMIC PROJECT VALUE WITH GEOLOGICAL VARIABILITY AND COPULAS

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ABSTRACT

Geological variability is one of the main factors that has influence on mining investment projects viability and technical risk of geology projects. Content of useful elements in mine face directly relates to mine production recovery. While assessing deposit value spatial distribution of useful elements in zones that are expected to be excavated should be investigated as it has impact on value of production in subsequent periods. The mineralization of the copper ore deposit is an issue frequently discussed in the literature. There is no definitive agreement on the theory of the deposit origin and the sources of metals contained what indicates complex multi-step mineralization process. In the mineralization considerations, the importance of tectogenesis in the definition of mineralization pathways is assumed. It was stated that systems of faults and joints have the effect on the increased concentration of metals in the deposit. In addition, there was a positive linear correlation between the copper and the silver content for the consecutive vertical profiles and the negative correlation between mine face height and the copper and silver content. Until now scenario, analyses of economic viability of new extraction fields were performed for KGHM underground copper mine at Fore-Sudetic Monocline with the assumption of constant averaged content of useful elements. In this article, we verify the value of production from copper and silver ore for the same economic background with the use of variable cash flows resulting from useful elements local variability. Furthermore in ore economic model we investigate if there is significant difference in model value estimated with the use of linear correlation between useful elements content and height of mine face, and the approach in which model parameters correlation is based upon the copula best matched information capacity criterion. Copula use allows simulation to take into account the multi variable dependencies at the same time, thereby giving a better reflection of the dependency structure, which linear correlation does not take into account. Calculation results of economic model used for deposit value estimation indicate that correlation between copper and silver estimated with copula use generate higher variation of possible project value compared to modelling correlation based upon linear correlation. Average deposit value remains unchanged.

THE INFLUENCE OF THE ROOF MOVEMENT CONTROL METHOD ON THE STABILITY OF REMNANT

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ABSTRACT

In the underground mines there are geological and mining situations that necessitate leaving behind remnants in the mining filed. Remnants, in the form of small, irregular parcels, are usually separated in the case of: significant problems with maintaining roof stability, high rockburst hazard, the occurrence of complex geological conditions and for random reasons (ore remnants), as well as for economic reasons (undisturbed rock remnants). Remnants left in the mining filed become sites of high stress values concentration and may affect the rock in their vicinity. The values of stress inside the remnant and its vicinity, as well as the stability of the remnant largely depends on the roof movement control method used in the mining field. The article presents the results of the numerical analysis of the influence of roof movement control method on remnant stability and the geomechanical situation in the mining field. The numerical analysis was conducted for the geological and mining conditions characteristic for polish underground copper mines belongs to KGHM Polska Miedz S.A. Numerical simulations were performed in a plane strain state by means of Phase 2 v. 8.0 software, based on the finite element method. The behavior of remnant and rock mass in its vicinity was simulated in the subsequent steps of the room and pillar mining system for three types of roof movement control method: roof deflection, dry backfill and hydraulic backfill. The parameters of the rock mass accepted for numerical modeling were calculated by means of RocLab software on the basis of the Hoek-Brown classification. The Mohr-Coulomb strength criterion was applied.

ACCELERATED COMPARATIVE FATIGUE STRENGTH TESTING OF BELT ADHESIVE JOINTS

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ABSTRACT

Belt joints are the weakest link in the serial structure that creates an endless loop of spliced belt segments. This affects not only the lower strength of adhesive joints of textile belts in comparison to vulcanised splices, but also replacement of traditional glues to more ecological but with other strength parameters. This is reflected in the lowered durability of adhesive joints, which in underground coal mines is nearly twice shorter then operating time of belts. Vulcanized splices require high precision in performance, they need long time to achieve cross-linking of the friction mixture and, above all, they require specialized equipment (vulcanization press) that is not readily available and often mine has to wait for its delivery down, what means no or reduced mining. All this reduces the reliability and durability of adhesive joints. In addition, due to the consolidation on the Polish coal market, the mines are joined to large economic units serviced by a smaller number of processing plants. The consequence is to extend the transport routs downstream and increased reliability requirements. The greater number of conveyors in the chain reduces reliability of supply and production losses. With the high fixed costs of underground mines, the reduction in mining output is reflected in the increase in unit costs, and this at low coal prices on the market can mean substantial losses for mines. The paper describes the comparative study of fatigue strength of shortened samples of adhesive joints conducted to compare many different variants of joints (various adhesives and materials). Shortened samples were more quickly fatigued in the usually long-lasting dynamic studies, allowing more variants to be tested at the same time. The high correlation between results of accelerated and traditional (full-length joint samples) studies enabled the use of accelerated research.

CORE CUTTING TEST WITH VERTICAL ROCK CUTTING RIG (VRCR)

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ABSTRACT

Roadheaders are frequently used machines in mining and tunnelling, and performance prediction of roadheaders is important for project economics and stability. Several methods were proposed so far for this purpose and, rock cutting tests are the best choice. Rock cutting tests are generally divided into two groups which are namely, full scale rock cutting tests and small scale rock cutting tests. These two tests have some superiorities and deficiencies over themselves. However, in many cases, where rock sampling becomes problematic, small scale rock cutting test (core cutting test) is preferred for performance prediction, since small block samples and core samples can be conducted to rock cutting testing. Common problem for rock cutting tests are that they can be found in very limited research centres. In this study, a new mobile rock cutting testing equipment, vertical rock cutting rig (VRCR) was introduced. Standard testing procedure was conducted on seven rock samples which were the part of a former study on cutting rocks with another small scale rock cutting test. Results showed that core cutting test can be realized successfully with VRCR with the validation of paired samples t-test.

THE EFFECTIVE BELT CONVEYOR FOR UNDERGROUND ORE TRANSPORTATION SYSTEMS

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ABSTRACT

Raw material transportation generates a substantial share of costs in the mining industry. Mining companies are therefore determined to improve the effectiveness of their transportation system, focusing on solutions that increase both its energy efficiency and reliability while keeping maintenance costs low. In the underground copper ore operations in Poland's KGHM mines vast and complex belt conveyor systems have been used for horizontal haulage of the run-of-mine ore from mining departments to shafts. Basing upon a longtime experience in the field of analyzing, testing, designing and computing of belt conveyor equipment with regard to specific operational conditions, the improvements to the standard design of an underground belt conveyor for ore transportation have been proposed. As the key elements of a belt conveyor, the energy-efficient conveyor belt and optimised carrying idlers have been developed for the new generation of underground conveyors. The proposed solutions were tested individually on the specially constructed test stands in the laboratory and in the experimental belt conveyor that was built up with the use of prototype parts and commissioned for the regular ore haulage in a mining department in the KGHM underground mine "Lubin". Its work was monitored and the recorded operational parameters (loadings, stresses and strains, energy dissipation, belt tracking) were compared with those previously collected on a reference (standard) conveyor. These in-situ measurements have proved that the proposed solutions will return with significant energy savings and lower maintenance costs. Calculations made on the basis of measurement results in the specialized belt conveyor designing software allow to estimate the possible savings if the modernized conveyors supersede the standard ones in a large belt conveying system.

RANDOM DETERIORATION PROCESS OF CONVEYOR BELT EVALUATED BY STATISTICAL ANALYSIS OF CORE FAILURES DETECTED ALONG BELT AXIS AND ELAPSED TIME

Leszek Jurdziak, Ryszard Blazej, Agata Kirjanów, Tomasz Kozlowski
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ABSTRACT

Magnetic diagnostic methods are used for steel cord belt condition evaluation since the beginning of 1970s. Initially they generated an analogue signal for several tens of centimetres of conveyor belts scanned sequentially with one measuring head in several cycles or the whole width of the belt at one time thanks to the installation of many measuring heads across the entire cross section. This did not allow identification of single centimetre failures, but rather an aggregate assessment of the state of quite wide waist. Modern diagnostic devices, thanks to miniaturization, allow up to 200 heads per belt width to identify damage of individual cords. Instead of analogue signals, they generate a zero-one digital signal corresponding to a change in the magnetic field sign, which can illustrate damage on 2D images. This makes it easier to identify the location and size of the damage in the belt image. Statistical analysis of digital signals summed up for consecutive sections along the belt axis allows to present both the source signal and its aggregation for band of a given width to form aggregate measures of belt damage such as the damage density per 1 meter of belt. Observation of changes in these measurements at different times allows on evaluation of its rate of change over time, which can be used to forecast future belt condition and to select the proper moment of preventive belt replacement to another one to avoid emergency downtimes (eg in underground mines) or to recondition of belts (eg. in lignite surface mines). The paper presents the results of investigations of the damage condition of a core of a single belt segment working in one of the copper ore underground mines. Scanning of the belt condition was performed few times at intervals of several months. The paper presents the results of the analysis of the changes in core condition, showing the random character of the damage process along the axis and its change over time.

ASSISTING SELECTION OF MINING SUPPORT FOR HEADINGS SITUATED IN A FIELD OF HIGH HORIZONTAL STRESS IN POLISH COPPER ORE MINES BY MEANS OF NUMERICAL METHODS

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ABSTRACT

Conditions and rules of applying rock bolts in headings specifying minimum rock bolt length and the basic scheme of bolting the roof and side walls are applicable in Polish copper ore mines in the Legnica-Glogow Copper Mining District (LGOM). No procedures (criteria) have been defined for proper selection of mining support for headings in an high horizontal stress field, including roof bolting scheme as a function of roof class and heading width above roof. This is why, for a long time now, as mining works progress in deeper regions of the rock mass in the LGOM, there is a need to identify the problem and define criteria (procedures) in order to ensure long-term and safe functioning of headings, particularly those being driven under unfavorable geological and mining conditions. This article concerns the problem of selecting mining support for access and preparatory headings driven in a field of high horizontal stress in Polish copper ore mines. This problem is very important due to the special safety requirements for mining headings that have been in use in mines for over a decade. The finite element method (FEM) was applied to assess the stability of mining headings under the conditions present in one of the copper ore mines in the LGOM (Rudna mine). Rock parameters for numerical modeling were determined on the basis of the Hoek-Brown classification. RocLab 1.0 computer software was used for this purpose. Stress field parameters were determined on the basis of Bulin's equations and on the basis of underground tests performed in the Rudna mine in 1996. Numerical modeling was performed by means of RS2 software in a triaxial stress state and plane strain state. The Mohr-Coulomb strength criterion was applied in numerical analyses. An elastic-plastic model with softening was applied to describe the rock medium. Based on obtained results of numerical analyses, an example of protection headings situated in a field of high horizontal stresses by rock bolts is presented.

MINING STRUCTURES COMPLEX MONITORING

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ABSTRACT

Modern mining enterprises are complex natural and technical system, so that its management is impossible without complete and reliable information about their individual elements state. The most hazardous in open mining are the sloping structures: open-pit sides, dump slopes, the dams of hydraulic structures. Sloping structures stability depends on a complex of factors (geological, hydrogeological, man-made structure and others), which have high spatial and temporal variability. Water plane monitoring in the structure of sloping body allows to evaluate online the sloping structure state by calculating the stability rate based on geomechanical slope models. During the time, as a result of changes in the exploitation conditions of man-made solid mass or rapid changes in the environment (additional clay rocks moistening, frozen soils thawing , etc.), the physical and mechanical properties of man-made deposits and their bases may change. This fact evaluates the need for periodic determinations of the soils main characteristics: density, specific cohesion and internal friction angle. In addition to landslides, geometric and hydrogeological characteristics, all these determine the shearing ratio and retaining forces in the solid mass. Determination of the measurements optimal frequency of aquifer levels and refinement of physical and mechanical properties by means of laboratory tests or statistical sounding contributes to a reduction in overall operating costs and allows ensuring compliance with environmental and industrial safety standards.

The reported study was funded by RFBR, according to the research project No. 16-35-60116 mol_a_dk

A TECHNIQUE FOR RECOVERY OF COBALT AND ZINC IN COAL FLY ASH BY ICP-OES

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ABSTRACT

Coal, bottom, and fly ash contain many elements that may be released into the environment through coal combustion processes and through leaching from disposed solid waste (Norris et al. 2010). The existence of hazardous trace elements, such as heavy metals, in coal has been a considerable problem on the viewpoint of environmental safety. Some of these hazardous elements will be released into the air while some of them are distributed in bottom and fly ash (Paul et al., 2006). Zinc is effective in vital events such as reproduction, development, immune, enzyme catalysis. Cobalt is used in metal coating, gas turbine motors, screws, exhaust outlet channels. The aim of this research was to investigate the total amount of Zn and Co in coal fly ash using ICP-OES analysis. Coal samples were obtained from Karatepe (Sirnak), SE Anatolia of Turkey. Karatepe (Sirnak) has 5.000.000 tons asfaltite reserves, approximately. After analytical sample preparations, the microwave acid digestion was applied. The ICP-OES instrumental conditions were optimized to obtain sufficient sensitivity and precision. The elemental and proximate analysis of coal fly ash samples were done. In addition, the Chromium, Thallium elements were analysed by ICP-OES.

This work was supported by Research Fund of the Dicle University. Project Number: DUBAP Fen.16.011 and Muhendislik.16.009

CHEMICAL SPECIATION OF IRON

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ABSTRACT

The determination of inorganic pollutants leaching from solid waste, such as coal, asphaltite, oil shale, and ash, is an important topic for industrial applications and solid waste management. This study presents the concentration and fractionation of iron (Fe) in asphaltite burning residue (ABR) and their determination by inductively coupled plasma optical emission spectrometry (ICP-OES). A modified BCR sequential extraction method was used for the fractionation of Fe in four forms (exchangeable, carbonates, bound to organic and sulphide, and residual content) (Aydin et al., 2012; Van Hullebusch, 2005; Sanei et al., 2001). Iron is an important element for both human health and the environment. The excess of Fe has toxic effect for both.Investigations on the Fe chemical fractions and their environmental mobility in ash solution systems were carried out. It was found that Fe in ABR (from Harbul-Sirnak, Turkey) occurs in the following fractions: Fe occurs in the following fractions: exchangeable (0.56 %), oxides (0.94%), organic matter and sulphides (1.33%), and residual content (2.41%). Among these fractions, the exchangeable and carbonate-bound fractions are unstable and prone to leach out, while the organic matter- bound fractions and the residual fractions are considered to be relatively stable and of low bioavailability.

This work was supported by Research Fund of the Dicle University. Project Number: DUBAP Fen.16.011 and Muhendislik.16.009

DETERMINATION OF SELENIUM AND NICKEL IN ASPHALTITE FROM MILLI (SIRNAK) DEPOSIT IN SE ANATOLIA OF TURKEY

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ABSTRACT

Asphaltite is one of the naturally occurring black, solid bitumen, which are soluble at heating in carbon disulphide and fuse. Asphaltite is also a solidified hydrocarbon compound derived from petroleum (Aydin et al., 2010). According to the World Energy Council, Turkish National Committee (1998), the total reserve of the asphaltic substances that are found in south-eastern Turkey is about 82 million tonnes, with Silopi and Sirnak reserves together comprising the major part of the Asphaltite deposits. (Erdogan et al., 2007). Selenium and Nickel are very important elements both environmental and health. Selenium plays an important role in the formation of the enzyme antioxidant effect in the cell. Italsoplays a protective role in cardiovascular diseases. The need for Selenium increases in situations such as pregnancy, menopause, growth and development, air pollution. Nickel is used for preventing iron-poor blood, increasing iron absorption, and treating weak bones. In this study, asphaltites were taken from Milli vein from Sirnak deposit in SE Anatolia of Turkey. A total of 6.500.000 tons of Asphaltite reserves have been identified as asphaltites in Milli (Sirnak). The sample preparation method was developed in Asphaltite by spectro analytical techniques, dry ashing and taciddigestion. MW-AD followed by ICP-OES were used for the determination of Seleniumand Nickel in Asphaltite bottom ash. Elemental (C, S, N and H) and proximate analysis of Asphaltite fly ash samples was made. It also, Seleniumand Nickel element analysis in Asphaltite were made. We would like to express our gratitude to all those making notable contribution to this study whose names we cannot mention one by one.

This study was carried out with the contribution of the Project DUBAP Muhendislik.16.009 and Fen.16.011

APPLICATION OF THREE EXISTING STOPE BOUNDARY OPTIMISATION METHODS IN AN OPERATING UNDERGROUND MINE

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ABSTRACT

The underground mine planning and design optimisation process have received little attention because of complexity and variability of problems in underground mines. Although a number of optimisation studies and software tools are available and some of them, in special, have been implemented effectively to determine the ultimate-pit limits in an open pit mine, there is still a lack of studies for optimisation of ultimate stope boundaries in underground mines. The proposed approaches for this purpose aim at maximizing the economic profit by selecting the best possible layout under operational, technical and physical constraints. In this paper, the existing three heuristic techniques including Floating Stope Algorithm, Maximum Value Algorithm and Mineable Shape Optimiser (MSO) are examined for optimisation of stope layout in a case study. Each technique is assessed in terms of applicability, algorithm capabilities and limitations considering the underground mine planning challenges. Finally, the results are evaluated and compared.

UTILIZATION OF YATAGAN POWER PLANT FLY ASH IN PRODUCTION OF BUILDING BRICKS

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ABSTRACT

Fly ash is a by-product of coal combustion which accumulates in large quantities near the coal-fired power plants as waste material. Fly ash causes serious operational and environmental problems. In this study, fly ash from Yatagan thermal power plant was used to produce light- weight building bricks. The study aimed to reduce the problems related to fly ash by creating a new area for their use. The optimum process parameters were determined for the production of real size bricks to be used in construction industry. The commercial size bricks (200 x 200 x 90-110 mm) were manufactured using pilot size equipment. Mechanical properties, thermal conductivity coefficients, freezing and thawing strengths, water absorption rates, and unit volume weights of the bricks were determined. Etringite (Ca6Al2(SO4)3 (OH)12 25(H2O)) and Calcium Silicate Hydrate (2CaO. SiO2. 2-4H2O) were identified as the binding phases in the real size brick samples after 2 days of pre-curing and 28 days curing at 50 oC and 95% relative moisture. The water absorption rate was found to be 27,7 % in terms of mass. The mechanical and bending strentgh of the brick samples with unit volume weight of 1.29g /cm3 were determined as 68.8 kgf / cm2 and 15.9 kgf/ cm2 respectively. The thermal conductivity of the fly ash bricks were measured in average as 0,340 W m-1 K-1. The fly ash sample produced was subjected to toxic leaching tests (Toxic Property Leaching Procedure (EPA-TCLP 1311), Single-step BATCH Test and Method-A Disintegration Procedure (ASTM)). The results of these tests suggested that the materials can be classified as non-hazardous wastes / materials.

APPROXIMATION OF PARTITION CURVES FOR ELECTROMAGNETIC MILL WITH INERTIAL CLASSIFIER. CASE STUDY.

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ABSTRACT

The article presents the impact of the separation parameters on the operation of the grinding and classification system using the electromagnetic mill and impingement-inertial classifier specially designed for this machine. Preliminary tests for the classifier have been carried out, and the effect of the separation efficiency on the value of the recycle flow that optimizes the operation of the grinding system is determined. Fourteen experiments were carried out to test and evaluate the classifier's work, with a variety of damping flaps acting on the airflow. The results provide an accurate assessment of the effectiveness and efficiency of the classifier. The approximation of the electromagnetic mill partition curves using the impingement-inertial classifier was performed by using Weibull distribution function.

EFFECT OF A DISPERSENT AGENT IN FINE COAL RECOVERY FROM WASHERY TAILINGS BY OIL AGGLOMERATION: PRELIMINARY STUDY

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ABSTRACT

Among the fine coal cleaning methods, the oil agglomeration process has important advantages such as high process recovery, more clean product, simple dewatering stage. Several coal agglomeration studies have been undertaken recently and effects of different variables on the process performance have been investigated. However, unlike flotation studies, most of the previous agglomeration studies have not used dispersing agents to minimize slime coating effects of clays. In this study, agglomeration process was applied for recovery of fine coals from coal washery tailings containing remarkable amount of fine coal. Negative effect of fine clays during recovery was tried to be eliminated by using dispersing agent instead of de-sliming. Although ash reductions over 90 % were achieved, performance remained below expectations in terms of combustible matter recovery. However, this study is a preliminary one. It is considered that more satisfied results will be obtained in the next studies by changing the variables such as solid ratio, oil dosage, dispersant type and dosage.

STUDY OF USAGE AREAS OF CLAY SAMPLES OF ASPHALTITE QUARRIES IN SIRNAK/TURKEY

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ABSTRACT

The asphaltites of Sirnak/Turkey are in the form of 12 veins and their total reserves are anticipated to be approximately 200 million ton in a field of 25,000 hectares. The asphaltites at the Sirnak region are in the form of fault and crack fillings and take place together with clay minerals at their side rock. The main raw materials used in the production of cement are limestone, clay and marn known as sedimentary rocks. Limestone for CaO and clay minerals for SiO2, Al2O3, and Fe2O3, which are the main compounds of clinker production, are the main raw materials. Other materials containing these four oxides like marn are also used as cement raw material. Conformity levels of the raw materials to be used in cement production vary according to their chemical compounds. The rocks to be used as clay mineral are evaluated by taking the rate of silicate and alumina into consideration. The soils suitable for brick-tile productions are named as sandy clay. Their difference from the ceramic clays is that they are richer in terms of iron, silica and carbonate. These soils are also known under the names such as clay, arid, alluvium, silt, loam and argil. Inside these soils, minerals such as quartz, montmorillonite, kaolinite, calcite, limonite, hidromika, sericite, illite, and chlorite are available. Some parts of the soils consist of clays in amorphous structure. Limestone parts, gypsums, organic substances and bulky rock residuals spoil the quality. The soils suitable for brick production may not be suitable for tile production. In this case, their sandy soils should be mixed up with the clays with fine granule structure which is high in plasticity. During asphaltite mining in Sirnak region, clays forming side rock are gathered at dump sites. In this study; SQX analyses of the clay samples taken from Avgamasya, Seridahli and Segürük asphaltite veins run in Sirnak region are carried out and their usage areas are searched.

NATURAL ZEOLITE SAMPLE AND INVESTIGATION ITS USE IN OIL BLEACHING SECTOR

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ABSTRACT

In the sector of oil bleaching, the stored raw oil is subjected to physical and chemical methods such as degumming, neutralization, bleaching, deodorization and winterization. In the process of oil bleaching, the selection of correct bleaching earth in accordance with oil characteristics matters so much. Bleaching earth is an inorganic product used in removing impurities being available within the structures of vegetable, animal oil (sunflower, soya, corn, palm, tallow, rapeseed, fish oils.etc.) and fatty acids, mineral oils (glycerin, paraffin, mineral motor oils.. etc.) with the adsorption process. The factors such as low cost of oil bleaching earth, low ratio of oil retaining, high bleaching capacity in spite of using them in small amounts, filter's delayed blocking by the earth and non-increase of the free acidity of the oil should be taken into consideration. Bleaching earths are processed with some acids in order to widen their surface areas. During this process, a certain amount of acid is left within oil bleaching earths even if it is very little. These acids also increase oil's acidity by oxidizing oil in the course of bleaching process. In this study, zeolite sample taken from Manisa -Demirci region was used. Following the processes of crushing and sieving, zeolite sample was subjected to chemical analyses according to their grain thickness, microscopic examination, the analyses of XRD and cation exchange capacity and their ore characteristics were determined. Afterwards, it was searched whether zeolite sample has oil bleaching ability or not or whether it can be used as oil bleaching earth or not.

MINERAL MATTER REMOVAL CHARACTERIZATION OF SOME TURKISH LIGNITES

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ABSTRACT

In the scope of this study, to determine the floatability characteristics of lignites, 5 samples were collected from various lignite reserves of Turkey namely Dursunbey, Çayirhan, Ilgin, Ermenek, and Gürmin-Merzifon and they were analyzed in terms of float and sink analysis. Some part of the original sample was taken apart and it was floated cleaned at ZnCl2 solution at density of 1.60 g/cm3. Proximate analysis of each lignite for original samples were carried out in the beginning of this study. In addition to this, carbon, hidrojen and nitrogen (C, H, N) values were determined for each lignite sample both in original sample and clean sample. In term of proximate analysis for the original samples, Çayirhan lignite sample has the lowest ash content as 19.52 % and Gürmin Merzifon lignite sample has the highest ash content of 44.06 %. Considering the carbon percentages both in original and clean samples, Gürmin Merzifon has the lowest as 33.95 % in original sample and 45.81 % in clean sample while Dursunbey has the highest as 45.04 % in original and 53.13 in clean sample. In order to determine the float and sink analysis graphic, the original samples were floated and sinked in 2 different ZnCl2 solutions of densities 1.40 and 1.60 g/cm3 respectively. As a result, 5 float and sink analysis graphic obtained and they would help one to understand and easily figure out the optimum medium density for cleaning. This study would help one to understand the cleaning propeeties of this respectively high ash content lignites. Mineral matter removal from the lignites is crucial since lignites has already high amount of ash and pyrites. Coal cleaning plants operators and the future researchers would have a usefull data to enhance cleaning efficiency.

PETROGRAPHIC COMPOSITION OF SOME TURKISH LIGNITES

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ABSTRACT

In the scope of this study, in order to determine the petrographical composition of lignites, 9 samples were collected from various lignite reserves of Turkey such as Saray, Dursunbey, Milas-Ekizköy, Yatagan, Çayirhan, Ilgin, Ermenek, Sorgun and Gürmin-Merzifon and they were analyzed with microscope in terms of their petrographic constituents. Turkey is a rich country in terms of lignite reserves and most of the lignites are being utilized in power production. Although lignites has been characterized in terms of general means such as their sulphur content or proximately/ultimately, there has not been a study focusing on the characterization of lignites petrographically. Samples have been collected from various regions of Turkey and their petrographic constituents (vitrinite, liptinite, inertinite, semifusinite, pyrite and mineral matter) percentages have been determined. Beforehand, these 9 samples were cleaned with float and sink set up in laboratory. Original and clean samples were taken from each location of lignites. In terms of vitirinite percentages for original samples, Ilgin lignites has the lowest as 32.8 % and Sorgun lingites has the highest as 90.0%. Vitirinite percentages for clean samples, Yatagan lignites has the lowest as 68.0 % and Gürmin-Merzifon lingites has the highest as 94.8%. Lignites should also be classified in terms of their pyrite contents, since they are known to have higher amount of pyrites with respect to hardcoals. Referring to the samples analyzed, Ermenek lignites has the highest amount of pyrites (6.40%) and Sorgun lignites has the lowest (1.60%). Pyrite removal with float and sink was achieved successfully and Sorgun lignites after cleaning has 0.4 % pyrite with lowest amount while Ilgin lignites has the 4.80%, highest after float and sink. Pyrite removal after float and sink achieved up to 75 % for Ermenek and Sorgun lignites (from 6.40% to 1.60 % for Ermenek, from 1.60% to 0.40% for Sorgun, however least removal of pyrite after float and sink was realized for Ilgin lignites (from 5.60% to 4.80%) respectively.

ASH CHARACTERIZATION OF SOME TURKISH LIGNITES

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ABSTRACT

In the scope of this study, in order to determine the ash characteristics of lignites, 10 samples were collected from various lignite reserves of Turkey such as Saray,Orhaneli Dursunbey, Milas-Ekizköy, Yatağan, Çayırhan, Ilgın, Ermenek, Sorgun and Gürmin-Merzifon and they were analyzed in terms of ash melting behavior and ash mineralogic composition. Lignite coal samples were burned in laboratory conditions and ash samples for each lignite were obtained. Turkey having high amount of lignite reserves and increasing demand of energy supply, combustion of lignites should be investigated in detail. In combustion processes, ash characterization is important due to not only for the information about the combustion process but also the compatibility of coal properties for the designed combustion scheme. Melting behavior of ash should be considered during the lignite combustion in a boiler because of some problems like slagging and fouling happen to be occurring. Depending on the temperature inside the boiler, ash particulates start to softening and it is followed by melting and gliding. In this study, ash samples for each 10 samples of lignites has been analyzed in terms of these three specific temperatures, i.e. softening temperature, melting temperature, and gliding temperature. Ash sample of Saray lignites has the lowest softening temperature of 1100 °C while ash sample of Ermenek has the highest as 1230 °C. In terms of melting temperatures, ash sample of Gürmin Merzifon lignite has the highest of 1295 °C while ash sample of Sorgun has the lowest melting temperature of 1020 °C. Considering the gliding temperatures of each ash samples of lignites, Milas Ekizköy has the highest as 1435 °C and Sorgun has the lowest as 1222 °C. Mineralogical analysis of the ash samples was also carried out and results were tabulated. Briefly talking about findings, SiO2 percentages change between 10.15% (Orhaneli) and 65.33% (Yatağan). SO3 and Cl concentrations are also important in ash mineralogical compositions due to environmental and abrasivity reasons. Regarding SO3 percentages, Gürmin Merzifon has the lowest as 1.21 % and Orhaneli has the highest as 30.08 %. Considering the Cl ion percentages, Sorgun ash samples has none and other samples have 0.01 while Ilgın has the highest of 0.03 %. Slagging and fouling potential of each lignite sample was calculated empirically and they were classified as high or low potential of slagging-fouling index in the scope of this study. This study would be helpful for future studies and the gaining importance of lignite and coal combustion, ash characteristics would be more focused.

THE CONTRAST CHARACTERISTICS OF THE MUSCOVITIC QUARTZITE (REPUBLIC OF KARELIA, RUSSIA) DETERMINING THE POSSIBILITY OF INTENSIFICATION OF THE BENEFICIATION PROCESS

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ABSTRACT

The use of muscovite are determined by its industrial look and quality. Sheet mica is traditionally used as electrically insulating material. Crushed mica dry or wet grinding and scrap (waste from the production of sheet mica) are used as electrical insulating material (for example, mica paper), filler in the manufacture of various kinds of fillers, grout and paint etc. In addition, today there is a steady demand for micronized muscovite for the production of decorative coatings and cosmetics. On the territory of the Republic of Karelia (Russian Federation) there is a significant number of deposits and occurrences moscoviticarum rocks. Promising target small iron-poor Muscovite is the manifestation of the Eastern Hitware identified in 1999. The average mineral composition of rocks of the productive series: quartz – 10-71%; Muscovite – 8-42%; plagioclase – 1,5-28%; kyanite – 2-13,5%; biotite, and 0.1-8%; ore (pyrite, sphalerite) and 1.5 – 11%. Enrichment of this type of mineral raw materials may be carried out using traditional methods - gravity, magnetic separation, flotation. Textural-structural and mineralogical features, a high degree of secondary changes (thin intergrowths of Muscovite with graphite, ozelenenie, the decrease of the strength characteristics) and the availability of areas and dedicated kwarcevania abundant pyrite mineralization disseminated and vein type significantly razboiul Muscovite ore, necessitate the adjustment of technological schemes and modes of enrichment. Possibilities of improvement of processes of pretreatment and subsequent enrichment is possible using the methods of pre-sorting that represent rational and cost-effective alternative to traditional beneficiation processes. To explore the possibility of using the optical methods being preconcentration, experimental study of the contrast of properties of samples of the original ore. The study was carried out on crushed material, graded by size: -10+5; -20+10; -40+20 -60 and+40 mm. the results revealed the main search area color shades in images of mineral samples in the color system HLS – grey, brown, bright yellow-orange and purple. The correlation between the color characteristics of the individual pieces and the content of muscovite. To implement the sort method of photometric separation, the threshold separation can be determined by one of the highlighted areas of the gamut or in their entirety. Next, the sorted ore with the same mineralogical and structural properties can effectively be enriched with gravitational methods. In the complex process of enrichment it is possible to obtain, in addition to muscovite, quartz and kyanite products, which undoubtedly will increase the output of marketable products.

RELATIONSHIP OF TECHNOLOGICAL PROPERTIES WITH DYNAMIC RECRYSTALLIZATION OF QUARTZ ON THE EXAMPLE OF OBJECTS OF THE KARELIAN-KOLA REGION

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ABSTRACT

Despite the significant reserves of quartz raw materials, there is a deficit of high purity quartz. It is due to the strict technical requirements imposed by standards for this type of raw materials and technological properties of quartz, which are determined by the features of the crystal structure. The crystalline structure is of particular importance for the technological properties of quartz, since such important characteristics as the limit of raw material enrichment, dissolution rate in acid, melting point of quartz, etc., are determined. The formation of the crystal structure of quartz under natural conditions is associated with the successive dynamic recrystallization of the mineral. The degree of dynamic recrystallization of quartz reflects the distribution of dispersed impurities. If it is weakly manifested, the dispersed impurities are not displaced from one zone to another, and all quartz microblocks contain approximately the same concentration. In this case, more or less uniform dissolution of various regions of quartz is observed, and the pattern of distribution of submicroscopic inhomogeneities is monotonic. If intensive dynamic recrystallization of quartz takes place, then it causes a significant redistribution of the scattered impurities. Then the treatment in HF leads to the appearance of a contrast pattern of the distribution of submicroscopic inhomogeneities. The details of the crystal structure of quartz in this work were investigated by the electron paramagnetic resonance (EPR) method using the ER-420 "Bruker" spectrometer. In the selected samples of quartz, the concentrations of isomorphic impurities Al and Ti were measured, and the degree of crystallinity D of the mineral was estimated from the EPR spectra of each of them. Thus, the technological properties of quartz are determined by various geological processes. The results of the studies show that when evaluating the prospects of quartz raw materials, it is necessary to take into account the staged dynamic dynamical recrystallization of quartz in natural conditions. This factor can play both a positive and a negative role at various stages of mineral formation. Its influence is reflected in the state of the crystal structure of quartz, which should be taken into account when developing effective technologies for its enrichment. The intermediate stage of dynamic recrystallization corresponding to the end of the second stage-the beginning of the third stage of quartz recrystallization-is optimal for the formation of high-purity quartz. When choosing a site for the first-stage quartz mining at large deposits in the Karelian-Kola region, one should be guided by the stage of dynamic recrystallization.

DYNAMIC CONSOLIDATION AND INVESTIGATION OF NANOSTRUCTURAL W-Y CYLINDRICAL BILLETS

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ABSTRACT

The main purpose of presented work is to obtain W-Y cylindrical bulk nanostructured billets by explosive consolidation technology (ECT) in hot condition, with low porosity near to theoretical densities and improved physical / mechanical properties. The first stage investigation were carried out for explosive consolidation of powders at room temperatures to obtain billets with increased density without cracks and activated surfaces of consolidated particles. The second stage investigation were carried out for the same billets, but consolidation were conducted in hot conditions, after heating of samples in between 940-11000C, the intensity of loading was equal to 10GPa. Tungsten is a prime material candidate for the first wall of a future fusion reactor. In this study, the microstructure and microhardness of tungsten-yttrium (W-Y) composites were investigated as a function of Y doping content (0.5÷2 wt. %). It was found that the crystallite sizes and the powder particle sizes were increased as a result of the increase of Y content. Nearly fully dense materials were obtained for W-Y alloys when the Y content was higher than 0.5 wt. %. Investigation revealed that the Y rich phases were complex (W-Y) oxides formed during the sintering process. Also very interesting to use doping chromium with yttrium-containing alloys. e.g. (W - 10÷12 Cr -0.5÷2 Y) wt. %. The extent up to which yttrium acts as an active element improving the adherence and stability of the protective Cr 2 O 3 layer formed during oxidation is assessed. The structure and characteristics of the obtained samples depends on the phase content, distribution of phases and processing parameters during explosive synthesis and consolidation. The processing of the precursors and the fabrication of W-Y nanostructured composites together with the detail description of explosive consolidation technique in hot condition and other features of structure-property relationship will be presented and discussed.

The authors gratefully acknowledge the financial support of the Shota Rustaveli National Science Foundation (SRNSF Grant Agreement ? YS15_2.2.10_101).

SELECTION OF COMPOSITIONS IN TI-CR-C-STEEL, TI-B, TI-B-ME SYSTEMS AND ESTABLISHING SYNTHESIS PARAMETERS FOR OBTAINING PRODUCT BY "SHS-ELECRTICAL ROLLING"

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ABSTRACT

For the production materials by the proposed Self-propagating High-Temperature Synthesis (SHS) - Electric Rolling method, there are no limitations in the length of the material and the width only depends on the length of rolls. The innovation method enables to carry out the process in nonstop regime, which is possible by merging energy consuming SHS method and Electrical Rolling. For realizing the process it is mandatory and sufficient, that initial components, after initiation by thermal pulse, could interaction with the heat emission, which itself ensures the self-propagation of synthesis front in lieu of heat transfer in the whole sample. Just after that process, the rolls instantly start rotation with the set speed to ensure the motion of material. This speed should be equal to the speed of propagation of synthesis front. The synthesized product in hot plastic condition is delivered to the rolls in nonstop regime, simultaneously, providing the current in deformation zone in order to compensate the energy loses. As a result by using the innovation SHS -Electrical Rolling technology we obtain long dimensional metal-ceramic product. In the presented paper optimal compositions of SHS chasms were selected in Ti-Cr-C-Steel, Ti-B and Ti-B-Me systems. For the selection of the compounds the thermodynamic analysis has been carried out which enabled to determine adiabatic temperature of synthesis theoretically and to determine balanced concentrations of synthesized product at synthesis temperature. Thermodynamic analysis also gave possibility to determine optimal compositions of chasms and define the conditions, which are important for correct realization of synthesis process. For obtaining non porous materials and product by SHS-Electrical Rolling, it is necessary to select synthesis and compacting parameters correctly. These parameters are the pressure and the time. In Ti-Cr-C-Steel, Ti-B and Ti-B-Me systems the high quality (nonporous or low porosity <2%) of materials and product is directly depended on the liquid phase content just after the passing of synthesis front in the sample. The more content of liquid phase provides the higher quality of material. The content of liquid phase itself depends on synthesis parameters: speed and temperature of synthesis. The higher the speed and temperature of synthesis we have, higher the content of liquid phase is formed. The speed and the temperature of synthesis depend on the ?? relative density of sample formed from initial chasm, this mean it depends on the pressure of formation of the sample. The paper describes the results of determination of optimal pressures in Ti-Cr-C-Steel, Ti-B and Ti-B-Me systems. Their values are defined as 50-70 MPa, 180-220 MPa and 45-70 MPa. This work is supported by Shota Rustaveli National Science Foundation (SRNSF) [Grant # 216972]

METHANE EXPLOSION MITIGATION IN COAL MINES BY WATER MIST

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ABSTRACT

Statistics shows that the majority of accidents with fatal outcome are caused by methane and/or coal dust explosion. This leads to assume that contemporary counter-explosion systems of various designs cannot be considered effective. Considering the growing threat of methane explosion in the coming years along with the development of deeper levels, the improvement of a system for protecting people in underground opening appears urgent. This paper focuses on technical solutions to be used in designing a protective system for minimizing the consequences of methane explosions in coal mines. The new protective system consists of three main modules: i) a high-speed shock wave suppression section; ii) a suppression section with a long-term action and iii) a system activating device. The shock wave suppressor contains a 200 litre volume water tank with a built-in gas generator and nozzles. These activated after 12 ms from the blast moment, the duration of discharge is 40 sec. The suppression section with a long-term action contains a 2000 litre volume water tank, a high-pressure pump, a hydraulic accumulator, solenoid valves, and a system of pipes with built-in nozzles. These activated after 4 sec from the blast moment, the duration of discharge is 8 min. The activation device includes detection block containing sensors, an emergency signal generation module, a signal transmission module, a signal receiving module and a power supply module. The system operates in a waiting mode and activates immediately upon the receipt of the start signal generated by the detector. The paper also addresses the preliminary results of the system prototype testing in the tunnel.

The work was performed with the financial support of the NATO SPS Programme and ISTC.

ELABORATION OF THE CHARGE CONSTRUCTIONS OF EXPLOSIVES FOR THE STRUCTURE OF FACING STONE

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ABSTRACT

Increased demand for high-strength facing material caused the enhancement of the volume of explosives use in modern technologies of blocks production. The volume of broken rocks and crushing quality depends on the rock characteristics and on the properties of the explosive, in particular on its brisance and serviceability. Therefore the correct selection of the explosive for the specific massif is of a considerable practical importance. For efficient mining of facing materials by explosion method the solving of such problems as determination of the method of blasthole drilling as well as of the regime and charge values, selection of the explosive, blastholes distribution in the face and their order is necessary. This paper focuses on technical solutions for conservation of rock natural structure in the blocks of facing material, mined by the use of the explosives. It has been established that the efficient solving of mentioned problem is attained by reducing of shock pulse duration. In such conditions the rigidity of crystalline lattice increases in high pressure area. As a result the hazard if crack formation in structural unites and the increases of natural cracks is excluded. Short-time action of explosion pulse is possible only by linear charges of the explosives, characterized by high detonation velocity which detonate by the velocity of 7-7,7km/sec and are characterized by very small critical diameter.

EXPERIMENTAL STUDY OF THE EFFECT OF WATER MIST LOCATION ON BLAST OVERPRESSURE ATTENUATION IN A SHOCK TUBE

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ABSTRACT

Explosion protection technologies are based on the formation of a shock wave mitigation barrier between the protection site and the explosion site. Contemporary protective systems use water mist as an extinguishing barrier. To achieve high effectiveness of the protetive system, proper selection of water mist characteristics is important. The main factors defining shock wave attenuation in water mist include droplet size distribution, water concentration in the mist, droplet velocity and geometric properties of mist. This paper examines the process of attenuation of shock waves in mist with droplets ranging from 25 to 400 microns under different conditions of water mist location. Experiments were conducted at the Mining Institute with the use of a shock tube to study the processes of explosion suppression by a water mist barrier. The shock tube consists of a blast chamber, a tube, a system for the dosed supply of water, sensors, data recording equipment, and a process control module. Shock wave overpressure reduction coefficient was studied in the shock tube under two different locations of water mist: a) when water mist is created in direct contact with blast chamber and b) the blast chamber and the mist are separated by air space. It is established that in conditions when the air space distance between the blast chamber and the mist is 1 meter, overpressure reduction coefficient is 1,5-1,6 times higher than in conditions when water mist is created in direct contact with blast chamber.

THE SYNTHESIS OF PHENYL ACETYLENIC PHENOLS TO DEVELOP NEW EXPLOSIVES

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ABSTRACT

The purpose of this research is to produce derivatives of simple phenols as "raw material" for the synthesis of new phenolic explosives. A big number of valuable products is synthesized from phenol and its homologues including well-known explosives - picric acid, methyl picrate, cresolite, etc. Generally, a structural modification of well-known explosives' molecules is the most important among the methods for the synthesis of new explosives. This method can be used in certain modifications. For example, the synthesis of methyl picrate is possible not only to replace picric acid's hydroxyl with metoxyl, but with nitration of anisole as well, i. e, by the reciprocating synthesis. Thus, to produce the new analogues of well-known phenolic explosives, the preliminary modification of simple phenols' molecules and further nitration, presumably by a formation of dinitro derivatives may be performed. The alkylation of phenol, anisole and m - cresol by the secondary phenyl acetylene alcohols in the presence of concentrated phosphoric acid was carried out. Para-substituted alkynyl phenols with high yields were developed. The chemical transformations were carried out by a participation of their molecules' active centers. The corresponding ethers, esters and saturated isologues have been synthesized. The article describes the conditions of a synthesis of 14 new phenyl acetylenic substances that may be used as substrates in a nitration reaction.

SHORT TIME LOADS OF T-BEAMS MADE OF CONCRETE MANUFACTURED WITH THE USE OF HIGH-PERFORMANCE RECYCLED AGGREGATE

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ABSTRACT

The paper summarises the experimental and numerical analysis of bearing capacity of concrete beams. First exam beam was prepared from reinforces high performance concrete (HPC) containing natural aggregate, another two was made of reinforces high performance concrete (HPC) containing recycling aggregate. Beams used on the tests were prepared in modeling scale with the T-shaped cross section of upper width 160 mm, bottom width 80 mm, height 120 mm and the effective span of 1100 mm. The program of tests a description of their realization, as well as the results obtained deflections and strains have also been presented. An analysis of the results obtained was carried out, which was compared to the results of the theoretical analysis based on standard regulations.

ELECTRODEPOSITION AND CHARACTERIZATION OF MN-CU-ZN ALLOYS FOR CORROSION PROTECTION COATING

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ABSTRACT

Mn-Cu-Zn alloys were electrodeposited from sulfate bath, containing citrate or EDTA and their mixtures as complexing ligands. The influence of bath composition and deposition parameters on alloys composition, cathodic current efficiency and structural and electrochemical properties were studied. At higher current densities (? 37.5 A/dm2) a uniform surface deposit of Mn-Cu-Zn was obtained. Optimal pH of electrolyte (0.3 M Mn2+ + 0.6 M (NH4)2SO4 + 0.1M Zn2+ + 0.005M Cu2+ + 0.05M Na3Cit + 0.15M EDTA; t=300C; ?=20 min) for silvery, nonporous coating of Mn-Cu-Zn alloy was within 6.5-7.5; coating composition: 71-83% Mn, 6-7.8% Cu, 11.5-20% Zn, current efficiency up to 40%. XRD patterns revealed BCT (body centered tetragonal) ?-Mn solid phase solution (lattice constants a=2.68 Å; c=3.59 Å). Corrosion measurements of deposited alloys were performed in aerated 3.5% NaCl solution. The corrosion current density (icorr) of the electrodeposited alloys on carbon steel was 10 times lower than corrosion rate of pure zinc and manganese coatings. Corrosion potential (Ecorr = -1140 mV vs. Ag/AgCl) of triple alloy coating preserved negative potential value longer (more than three months) compare to carbon steel substrate (Ecorr = -670 mV vs. Ag/AgCl). Tafel polarization curves taken on Mn-Cu-Zn alloy coating in aerated 3.5% NaCl solution did not show a typical passivation behavior which can be explained by formation of low solubility of adherent corrosion products on the alloy surface.

ASSESSMENT AND MAPPING OF CROPLAND ECOSYSTEM CONDITIONS AND ECOSYSTEM SERVICES, PROVIDED BY THEM ON THE TERRITORY OF BULGARIA OUTSIDE THE BOUNDARIES OF NATURA 2000 NETWORK

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ABSTRACT

The present work proposes a synthesis of the ecological conditions and services provided by the mapped croplands in Bulgaria (outside NATURA 2000). The research was carried out during the implementation of the project "Mapping and assessment of heathland and shrub ecosystem services in Bulgaria (outside NATURA 2000)" as an additional activity. The project is performed by experts from Sofia University "St. Kliment Ohridski", ABERON Bulgaria and Kartgeo LTD. It was realized with the financial support of Program BG03 "Biodiversity and Ecosystem Services" in Bulgaria under the Financial mechanism of the European Economic Area 2009-2014. For a period of 8 months, 213 209 polygons (3435029 ha) occupied by croplands were evaluated in an attempt to assess their potential to support ecosystem services. This activity is relevant to the EU initiative for mapping of the ecosystem services, which is conducted under action 5 of the EU Biodiversity Strategy. The initiative calls Member States to map and assess the ecosystem conditions and ecosystem services, provided by them on their national territory. The ecosystem mapping and assessment follow the methodology of MAES and classification system of CICES adapted by the Bulgarian Ministry of Environment and Water (http://bg03.moew.government.bg/bg). This methodology requires gathering data about a set of indicators concerning the condition of the ecosystems (biotic diversity, abiotic heterogeneity, energy budget, matter budget and water budget) and the provided direct and indirect ecological services to the human society (provisioning, regulating and cultural). The data were collected from national and international databases and fieldworks. The mapping was based on maps from the Physical blocks, which are the most relevant, complete and consistent land use and land cover maps. In accordance with the methodology the study concerned has distinguished five subtypes of croplands (agro-ecosystems) - 201 Annual crops (mostly cereals), 202 Perennial crops (fruit gardens and vineyards), 203 Perennial crops (mostly legumes), 204 Mixed croplands, 205 Livestock farms for large and small animals including bees. Regarding the condition, most agro-ecosystems are assessed with categories good or very good as values. However the values for biotic diversity and matter budget are slightly lower due to the applied intensified type of agriculture. In general, the services provided by agro-ecosystems are with medium relevant to high relevant capacity, except the cultural services which are assessed with low relevant to relevant capacity.

SEDIMENT DELIVERY FROM HILLSLOPE CULTIVATION IN NORTHWEST VIETNAM

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ABSTRACT

Cultivating on hillslopes in Northwest Vietnam induced soil erosion that reduce overall soil fertility, capacity of water bodies and drainage ditches or channels, and enhance the risk of flooding, even obstruct traffics and create "mud flooding or landslide'. This study aimed at assessing the magnitude of erosion under maize monocropping and perennial teak plantation on a rainstorm basic over two years 2010-2011 using double sediment fences installed at convergent point of catchments (slope inclination of 27-74%). Mean annual soil erosion under maize cultivation was 4.39 kg.m-2, being far greater than that under teak plantation 1.65 kg.m-2. Intensive tillage in maize monocropping and clearance of land before sowing was most probably the causes induced such effect as no tillage was performed in teak plantation during monitored period. Larger sediment generated across two land use types in year 2010 (4.11 kg.m-2) compared to year 2011 (1.87 kg.m-2) was attributed to higher amount and intensity of precipitation in the first year (1448 mm) as compared to the latter year (1299 mm). Reducing tillage and establishing good cover for maize monocropping on steep slopes, therefore, are necessary to reduce soil erosion and control sediment delivery to downstream.

GIS-BASED SUITABILITY MODEL FOR ASSESSMENT OF FOREST BIOMASS ENERGY POTENTIAL IN A REGION OF PORTUGAL

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ABSTRACT

This work focuses on developed a decision support system based on multicriteria spatial analysis to assess the potential for generation of biomass residues from forestry sources in a region of Portugal (Beira Baixa). A set of environmental, economic and social criteria was defined, evaluated and weighted in the context of Saaty's analytic hierarchies. The best alternatives were obtained after applying Analytic Hierarchy Process (AHP). The model was applied to the central region of Portugal where forest and agriculture are the most representative land uses. Finally, sensitivity analysis of the set of factors and their associated weights was performed to test the robustness of the model. The proposed evaluation model provides a valuable reference for decision makers in establishing a standardized means of selecting the optimal location for new biomass plants.

COMPACTION OF CONFINED POROUS SUB-SURFACE RESERVOIRS

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ABSTRACT

Fluid extraction has led to compaction, subsidence and even earthquakes many places around the world. Although rare, the environmental cost could be overwhelming. Once compaction has been identified, possible future consequences should be investigated. If deemed adverse, preventive actions should be started as soon as possible to prevent further damage. The purpose of this study is to enable prediction of possible compaction by a simplified analytical model. Studies by numerical models are time consuming and expensive. A fluid extraction period may also be necessary to match the model to observed behaviour. Due to simplicity, we believe our methodology will be useful as an initial screening tool. Our model, which is a generalization of a classical one (Pedrosa, 1986), has been extended to account for boundary dominated flow and for the effect of wellbore storage and skin. During the last decades, many studies have expanded and improved the Pedrosa theory. According to our knowledge, the inclusion of compaction is original with us. Our model will simplify to the model of Pedrosa and many others by simple changes in the input data. In addition, the traditional model without stress-sensitivity is included as limiting behaviour. Results are presented by way of type curves, both for the pressure and pressure-derivative. The model depends on the assumption of exponential behaviour of all pressure-dependent variables. Then, a logarithmic substitution transforms the non-linear governing equation into a diffusivity equation of linear appearance. Hence, most commercial well test simulators already include the majority of coding to take advantage of the technique. We derive an equation for the dynamic behaviour of the thickness and present plots of the normalized thickness as a function of time. Theories for flow in stress-sensitive formations, with exponential behaviour, have been generalized to account for compaction. The pressure and pressure-derivative type curves fall above the ones without stress-sensitivity. The non-linear correction shows up as the vertical displacement between the non-linear (stress-sensitive) and the linear (traditional) type curves. Failure to recognize stress-sensitivity will lead to erroneous well test interpretation. The method can easily be adapted in commercial well test simulators.

HYDROGEN TRANSFER DURING LIQUEFACTION OF ELBISTAN LIGNITE TO BIOMASS, PART-1: TOTAL REACTION TRANSFORMATION APPROACH

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ABSTRACT

Given the high cost of the tetralin solvent commonly used in liquefaction, the use of manure with EL is an important factor when considering the high cost of using tetralin as a hydrogen transfer source. In addition, due to the another cost factor which is the catalyst prices, red mud (commonly used, produced as a byproduct in the production of aluminum) is reduced cost in the work of liquefaction of coal, biomass, even coal combined biomass, corresponding that making the EL liquefaction an agenda for our country is another important factor. Conditions for liquefaction experiments conducted for hydrogen transfer from manure to coal; Catalyst concentration was 9%, liquid / solid ratio was 3/1, reaction time was 60 min, fertilizer / lignite ratio was 1/3, and the reaction temperature was 400 ° C operated. Also the mixing speed was 400 rpm and the initial nitrogen pressure was fixed at 20 bar. In order to demonstrate the hydrogen transfer from manure to coal, coal is used solely, by using tetralin (also known as a hydrogen carrier) and distilled water which is not hydrogen donor as a solvent in the co-liquefaction of experiments, and also the liquefaction conditions are carried out under an inert (N2) gas atmosphere. According to the results of the obtained liquefaction test; Using tetralin solvent the total liquid product conversion percentage of the oil + gas conversion was 9.82%, however, the results of oil/gas conversion obtained using distilled water and EL combined with manure the total liquid product conversion percentage was 23.42%. According to the results of calorific value and elemental analysis, only the ratio of H/C(atomic) of coal obtained by using tetralin increased with the liquefaction of manure and water. The reason of the increase in the amount of hydrogen due to hydrogen transfer from the manure on the solid surface of the coal, and also on the surface of the inner pore of the coal during the liquefaction, brings about the evaluation of the coal as a structure involved in the recycling through the liquefaction plant if it is being installed. As a result of this study, results obtained from oil + gas and char products show that when distilled water is used instead of tetralin during liquefaction of EL with manure, abundant crude hydrogen transfer takes place and that the production of oil which is also alternative of current oil production increased with H/C(atomic) and oil + gas product conversion.

RESEARCH ON THE LANDSCAPE ATTRACTIVENESS OF THE SELECTED ABANDONED QUARRIES

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ABSTRACT

The publication presents the research results concerning determination of the level of landscape attractiveness of the abandoned quarries. The research concerned 20 structures located within the area of Poland, Great Britain and Austria. The research used procedures of landscape attractiveness assessment which includes three research methods: survey method with the use of the semantic differential, the method of point bonitation and the landscape entropy method. Throughout the conducted analyses, the level of landscape attractiveness of the quarries was determined through including them into one of four classification groups. The main motif showing quarries' attractiveness (group I) is their uniqueness, differentiation, as well as interest and curiosity evoked. What is more, these structures are characterised by a good state of preservation, not an advanced level of natural succession, good road accessibility, and occurrence of surface waters. They may be used for universal social education. e.g. making a didactic place. Quarries showing landscape attractiveness (group II) are usually characterised by slightly lower parameters compared to group I. They usually have a lesser vertical differentiation, and the pace of natural succession is a bit faster, and thus some precious and interesting geological profiles are covered.On the other hand, slightly attractive quarry landscapes (group III) have elements which decrease their attractiveness evaluation (e.g. little height differences, hindered access to the structure). Unattractive quarries (group IV) do not contrast surrounding areas, remain hardly visible and are not accessible along the set routes. What is more, they have very little vertical differences, preservation state is very bad while the pace of natural succession is meaningful. These structures are not perceived as interesting or useful.

PRELIMINARY ASSESMENT OF HEAVY METAL CONCENTRATION IN KÜTAHYA-ESKISEHIR HIGHWAY ROADSIDE SOILS

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ABSTRACT

Heavy metals can show enrichment in the environment either naturally or anthropogenically and could be harm living organisms. Besides, these metals and its compounds are accumulated in road side soils because of vehicle exhaust emissions, vehicle breaks parts and any other sources. One of the most important transportation systems is the highways. The effects of highways on the surrounding air, water and soil are ineluctable. There are voluminous researches about such pollutions in roadside soils worldwide reporting heavy metal contaminations. Nonetheless, there is no study conducted about roadside soils of Kütahya - Eskisehir Highway (KEH), which is one of the most used routes in the Eastern Aegean Region of Turkey. This study was carried out to identify levels of selected five potentially toxic heavy metals (Pb, Zn, Ni, As, Cr) contamination in the roadside soils that are not used in agricultural practices. 48 road side soils samples along the KEH were collected from top soils on both sides of the highway. Inductively coupled plasma-mass spectrometer (ICP-MS) was used to determine contents of these heavy metals. Heavy metals concentrations in those samples varied from 38 to 664.24 mg/kg for Ni, 21.10 to 473.1 mg/kg for Cr, 12.5 to 213.6 mg/kg for Zn, 7.71 to 53.03 mg/kg for Pb, 2 to 22.5 mg/kg for As, respectively. The pollution level in the samples was defined using method of enrichment factor (EF) and geoaccumulation index (Igeo). The highest EF values were found for Ni and As while the highest Igeo values were for Ni and Pb.

INFLUENCE OF LIMESTONE POWDER ON SOIL QUALITY IMPROVEMENT

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ABSTRACT

In Portugal, there are several industries dedicated to the extraction and transformation of stone, namely limestone, producing a large amount of stone residues. This kind of sub-product is often considered a residue and taken to landfill since there is a lack of technical solutions for its utilization. In other countries, stone powder is already used for several applications, however in Portugal, there seems to be a long way regarding the use and valorisation of stone powder. Given the high calcium and magnesium content of limestone powder, the application of this material can be beneficial for soil improvement. In addition, it can be used as an alkalizing mineral in acid soils. The present study aims to study the implications of the stone powder as a soil improvement material and to assess the associated environmental impacts and economic viability. To assess the capability of the limestone powder to improve the soil quality, an experimental setup was developed in order to research the different dosages of limestone powder to be incorporated in alkaline and acid soils by measuring the values of pH and the content of calcium and magnesium. In this research, two different types of limestone powder were used: one containing flocculant, resulting from the treatment of the water used to cut the limestone (coagulation/flocculation process) and limestone powder from the limestone finishing processes who has no flocculants. Therefore, twenty-eight samples were prepared in the laboratory, each one with 1 kg of soil with particle-size fractions <2 mm. Five samples with alkaline soil and five with acid soil were prepared in duplicate, to which different amounts of limestone powder without flocculants were added (0; 2; 10; 15; 50; 80 g kg-1). Three acid soil samples were also prepared in which different dosages of stone powder were incorporated with flocculant (2, 15, 50 g kg-1). Additionally, two samples were prepared as control. Throughout the experiment, a constant moisture content was maintained by adding an equal volume of water to each sample. Simultaneously, at a farm an additional experimental setup was prepared, where 4.8 kg (0.6 %) of limestone powder were added to a 6 m2 plot. In all laboratory and field site experiments a significant increase of the pH and the content of calcium and magnesium values was observed, allowing to estimate the ideal dosage of limestone powder to be applied to the soil. In terms of soil improvement, no significant differences were found between the use of limestone with or without flocculants. Though for the industries, the reuse of the limestone powder resulting from the water treatment process can be seen as more advantageous in an economical point of view.

THE BEHAVIOURAL RESISTANCE IN INSECTS: ITS POTENTIAL USE AS BIO INDICATOR OF ORGANIC AGRICULTURE

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ABSTRACT

Most of the investigations carried out on the resistance of the insects to pesticides have been focused on the physiological and biochemical mechanisms, However, the behavioral answers that pesticide induces in the insects have received very little attention. The symptoms of insects affected by insecticides, or neurotoxical pre mortem effects, include spasmodic activity, hyperactivity and leak of the surfaces impregnated by the pesticides. These reactions provides a first barrier of defense, named behavioural resistance. Previous experiments carried out on olive groves usually subjected to pesticide application, have allowed to visualize a reaction of leak of the natural enemies from treated areas, which is reflected as an increase of its rate of capture in sticky chromatic traps, in relation to the areas free of pesticides. The aim of this research is to evaluate the reaction of the main predators of the olive pests under different conditions: i- Traditional olive grove, where pesticides are usually applied; and ii- Organic olive grove, where pest management depends exclusively on the role of the natural enemies. During the spring of 2016, experimental applications have been carried out in two olive groves of the province of Jaén (south of Spain) by means of a commercial pesticide application, in order to induce behavioural resistance and to evaluate the reactions induced in the main species of olive pests predators. Six pairs of plots were randomly selected in both traditional and organic olive grove, three of these were pesticide sprayed, whereas a second series of three plots were free of pesticide application. Sticky yellow traps were installed in both treated and control plots just after application of pesticide. The results allow to determine the existence of two different reactions in both types of olive groves. In the plots of the traditional management, a significant increase of the capture values of predators was observed. However, in the ecological groves, a lack of behavioural resistance was observed The ecological implications of this study open a new field of research, which provides new criteria to assess the qualification of the organic agriculture.

THE ROLE OF ANIONOGENIC ELEMENTS (As, Sb, Mo, Se, S, P, N, Cl, F, C) IN THE FORMATION OF TECHNOGENIC GEOCHEMICAL ANOMALIES

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ABSTRACT

The study was conducted on the example of sulfide-containing mine tailings with a varying amount of sulfide and arsenide minerals, from three distinct tailings dumps situated in Russia: Karabash Mine Site, South Ural; Komsomolsk tailings impoundment, Kemerovo region; Khovu-Aksy mine site, Tuva Republic. The aim of the study was to compare the mobility of anionic elements (As, Sb, Mo, Se, S, P, N, Cl, F, C) and their role in migration, precipitation, and concentration of metals during the water-tailings interaction depending on the physicochemical parameters (pH, Eh) of the medium and the mineral composition of the waste material. Using slightly acidic leaching experiments the quantitative estimation of mobile forms of elements is given. Based on the compositions of the obtained water leaching solutions aqueous speciation of chemical elements and saturation index of key minerals in the experimental solutions were calculated. The results of calculating the forms of chemical elements made it possible to construct series of mobility of metals and metalloids in solutions with different physicochemical parameters. In the alkaline conditions, Sb> As> Cd> Cu> Zn> Fe> Pb, when the medium is acidified, the series changes, As> Cd> Cu> Zn> Pb> Sb> Fe; In weakly alkaline conditions, Sb> Mn> As> Zn> Fe; however, when the medium is acidified, the series changes to, Cd> Mn> Pb> Cu> Zn> Sb> Ni> Fe> As; Under acidic conditions, Cd> Cu> Zn> Pb> Mn> Fe> Se> Mo> Sb> As> Ni. The mineral composition of the tailings was investigated, which will allow to determine the sources of toxic elements and to understand the processes of secondary mineral formation in technogenic objects. Arsenopyrite and pyrite predominate in the heavy fraction of the Komsomolsk tailings impoundment, arsenopyrite grains are often corroded, Sb contained in Sb oxide and Sb sulfide. The pyrite and barite are determined in the solid matter of the Karabash Mine Site and chalcopyrite, sphalerite, tennantite Cu_3AsS_3, and tetrahedrite $(Cu,Fe)_{12}Sb_4S_{13}$ are determined in the form of inclusions in grains of pyrite.

ANTHROPOGENIC POLLUTANTS IN ORGANIC EXTRACTS FROM MARITSA IZTOK DUMPS

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ABSTRACT

Recent investigations proved that different organic components, i.e. hydrocarbons, phenols etc. move through/release out of the dump area as a result of alteration processes of the organic matter (OM) caused by the wash-out and/or drainage processes. The timeliness of the present study is based on the scarcity of information on organic geochemistry of dump materials from open pit coal mines and weathered lignites in particular. Coals are suspected for many human health problems, and are an object of the new discipline - "medical geology". Potential human health risk of organic compounds with coal/lignite provenance includes endocrine disruption, nephrotoxicity, and cancer. The limited number of studies on dumps clarify that even for the "short" time span (some tens of years) in geological point of view, processes of transformation of the extractable OM are detectable. The secondary phases, a result of the OM transformations, move through and out of the dump area and could be potential contaminants for the surface and underground waters and soils in the area. Additional environmental problem comes from the air-born VOCs and wastes of the modern industry. Dumps samples (ca. 40 g) were extracted by chloroform (?300 ml), under reflux for 30 h. Chloroform-soluble organic matter (SOM) was concentrated and asphaltenes were precipitated by pouring into cold n-hexane (1:100 v/v). The soluble portions (maltenes) were concentrated and subsequently separated via column chromatography. Mini-glass column (10×1 cm) with Kieselgel (35-70 mesh ASTM) was used. Likewise, SOMs of the two dump samples were fractionated into fractions: neutral, aromatic/slightly polar, and polar. Subsequently the first two of them were studied by gas chromatography-mass spectrometry (GC-MS). In the slightly polar fractions of the chloroform SOM of dump samples a broad set of components, possible pollutants according to the national regulation norms, was determined, i.e. phthalates (dominant), i-propyl palmitate, i-propyl myristate, n-hexyl benzoates, etc. These organic contaminants could be regarded more likely as anthropogenic (originating from plasticizers, industrial pollutants, pesticides, etc.). Presently, it seems that the identified compounds do not represent an acute toxic risk from an environmental viewpoint. However, some compounds could raise concerns and further attention is needed to be focused on them.

PHYTOREMEDIATION OF SELENIUM CONTAMINATED SOIL BY PERISAN CLOVER

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ABSTRACT

In these study phytoremediation of contaminated soil has been studied. Selenium is an essential nutrient for living organisms but selenium at higher concentration is toxic. Selenium comes from chemical fertilizer, mine drainage, industrial activities, and waste water and so on. Phytoremediation is an eco-friendly way to remove soil contaminants. In present research Persian clovers used as a hyper accumulator of selenium. Soil samples with different amount of selenium were prepared from mining area. Contaminated soil samples keep in greenhouse and Persian clover cultivated in polypropylene pots. Persian clover is one of the native plant of Damavand region. Soil samples dried at 60 °c in oven. For wet digestion HCl and HF add to samples. The amount of selenium in soil were measured before and after cultivation. The amount of selenium in soils decreased after 60th day's cultivation. Plant harvest at 30th days and 60th days after planting. Plant materials divided into two part root and upper parts (include stem, leaf). Plant samples were washed by deionized water to removed surface soil. Plant parts dried at 75 °c in oven. Heavy metal analyzed by plasma optical emission spectrometry (ICP-OES). Accumulations of selenium in plant tissues were measured. The reduction of selenium has been seen in all soil samples. Selenium extract by Persian clover. Translocation factor (TF) has been calculated. Rate of concentration of selenium in upper part of plant are higher than root. Leaves> shoots > root is the order of selenium accumulation rate in the Persian clovers. At the 60th day amount of selenium concentration is less than amount in 30th days, it seems selenium is transformed in the leaves or vaporized of leaves. Higher reduction rate has been observed in high contaminated samples. Result indicate that Persian clover is a hyper accumulator of selenium and during growth period doesn't show any sign of phytotoxicity and seems in some stage has a positive effect on growing.

PREPARATION OF MAGNETIC SORBENT WITH SURFACE MODIFIED BY C18 FOR REMOVAL OF SELECTED ORGANIC POLLUTANTS FROM AQUEOUS SAMPLES

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ABSTRACT

Magnetic sorbents have great potential in environmental applications due to their simple synthesis and separation in magnetic field, usability in heterogeneous systems and low toxicity. Possible syntheses, surface modifications and characteristics were described by Li et al 2013. This type of solid-phase extraction is being successfully used in various fields as health care, microbiology, biotechnologies (Safaríková, Safarík 1995) or sample preconcentration in analytical chemistry (Chen 2011, Aguilar-Arteaga et al 2010). In this preliminary study we report on the preparation and application of magnetically separable sorbent with surface modified by C18 alkyl chain for purification of water contaminated by environmentally hazardous organic compounds. Magnetic cores were co-precipitated from Fe2+ and Fe3+ chlorides in alkalic aqueous solution. Surface of synthetized Fe3O4 was modified with SiO2 by tetraethylorthosilicate to assure physico-chemical stability. Furthermore, Fe3O4/SiO2 complex has been treated by C18 functional group, which provides good affinity towards hydrophobic substances in water. Sorption efficiency of prepared magnetic sorbent for removal of benzene, toluene, ethylbenzene and xylenes (BTEX) from model aqueous samples under various conditions has been examined. BTEX can be found in petroleum products which contaminate air, soil and groundwater near of store tanks. Sorption kinetics was followed by gas chromatography with mass spectrometry. The preliminary sorption kinetics data and efficiency of BTEX removal point at the possible application of prepared magnetic sorbent for BTEX removal, especially for ethylbenzene and xylenes.

MONITORING OF THE GREEN ROOFS INSTALLATION IN BRNO-CITY DISTRICT, CZECH REPUBLIC

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ABSTRACT

In spite of the rapidly growing interest to the green roofs, there is insufficient information about their local quantities and areas in Czech Republic as well as in Central Europe. There is a lack of technical information that leads to the further development, application and environmental contribution of green roofs under local climatic conditions. The purpose of the research is to follow the tendency of how the process of green roofs' popularization is performed in the Czech Republic and to determine basic parameters of the installed green roofs. These parameters include total quantity, area and the most common roof vegetation type (extensive or intensive); how many green roofs were installed over the last years and as a result, how the proportion of the green roofs to the conventional ones is changing. For initial evaluation Brno-City District was chosen as the next stage of university environmental project Envihut following the genesis of green roofs under local weather conditions. Input data were obtained from web mapping services. It was found that the total quantity of green roofs in Brno-City District increased from 45 in 2003 to 233 in 2017, and this include 77% of roofs with extensive and 23% with intensive vegetation. On the data analysis, it is possible to determine the contribution of green roofs in Brno for rainwater and stormwater management.

URBAN PARK AS INITIATTOR OF SPONTANEOUS ECOLOGICAL NICHES

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ABSTRACT

Urban parks constitute territories of "compensation" for lost green spaces in Israel. In addition, they have a high potential to preserve or to increase species biodiversity in the urban area. The area of the parks is divided into functional zones, including various microenvironments. One can assume that the contribution to the improvement of the parks' environment differs among the microenvironments. The present study uses a comparative analysis between soils in different functional zones of urban parks in order to indicate areas with high potential of contribution to the urban ecosystem. In Tel Aviv-Jaffa 36 parks, of various sizes (from 0.2 to 5 ha), were randomly chosen. In each park 4 microenvironments were selected: lawn, trail, picnic areas and peripheral zone (area that is not organized to receive visitors). In these microenvironments, soil was sampled in a number of points from three depths (0-2, 5-10, 10-20 cm). For each soil sample organic matter content, pH, electrical conductivity and soluble ions were determined. Penetration depth of soil surface was measured prior to the soil sampling. The results showed that the averages of the soil properties and their variability changed according to the type of microenvironment, soil depth and park size. The penetration depth and organic matter content were the most susceptible to visitors' pressure: the highest values were obtained in the environment with low visitors' pressure (grass area and peripheral zone). These results indicate high fertility and better ecological conditions in the soil of these areas with respect to those in the high visitors' pressure areas (trail and the picnic areas). This phenomenon was also found in small parks with an area of about 0.2 ha. The increase in the size of the park was also accompanied by a decrease in the averages and variability values of penetration depth and the organic matter content. It can be concluded that in urban parks a development of "spontaneous islands", with much more fertile soil than that of the remainder of the park areas, occurs. Such "islands" serve as ecological niches, which provide more options for enhancing and preserving biodiversity in the urban area. Designing or using "spontaneous" niches within the park could increase the sustainability of the urban ecosystem.

MERCURY(II) REMOVAL FROM AQUEOUS SOLUTIONS USING MICROPOROUS ZEOLITES

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ABSTRACT

Water is essential for the survival of living organisms and its preservation is a global concern, therefore it is necessary to treat it after use. Among the relevant contaminants present in waste waters, mercury is one of the most hazardous non-essential metals even at low concentrations. In this work, the ability of two microporous materials synthesized at University of Aveiro – AM-11 (Aveiro-Manchester no. 11) and AM-14 (Aveiro-Manchester no. 14) – for mercury removal has been investigated. With the aim to study the equilibrium and kinetics of mercury uptake, experiments were carried out under batch conditions at pH 6 and room temperature, contacting a fixed volume of solution with initial concentration of ca. 1000 µg/L with different accurate masses of AM-11 (1.0-14.0 mg) or AM-14 (1.5-12.0 mg) until equilibrium. Two and three parameters isotherms were selected to represent the measured data of both materials. The Langmuir equation provided better results for AM-11, with Average Absolute Relative Deviation (AARD) of 3.88 % and Adjusted Coefficient of Determination (R_adj^2) of 0.974, and furnished an ion exchange capacity of 161 µg/mg. On the contrary, Temkin isotherm performed better for AM-14, achieving AARD=3.92 %, R_adj^2=0.986 and a capacity of 280 µg/mg. The kinetic study of both systems was carried out using pseudo-first and pseudo-second order models, being the best results obtained by the last one in all cases (AARDs between 10 and 19 %, and R_adj^2 between 0.952 and 0.988). Finally, the behavior of our materials was compared with other sorbents from the literature, and it was concluded they can be used with advantage for mercury removal.

MONITORING MARINE BENTHIC MACROPHYTES (SEAWEED AND SEAGRASS) SPECIES IN THE ANCIENT CITY OF PHASELIS

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ABSTRACT

Phaselis was founded as a port city by the Rhodes in VII century, B.C. The Phaselis coast has been home to the ships for hundreds of years and is also a frequent destination for day trips today. Unfortunately, intense boat traffic affects coastal ecosystems. In this study, the effects of this traffic on seaweed and seagrass, which have great importance in the coastal ecosystem of Phaselis Ancient city, have been researched. Samples were collected by scientific SCUBA diving in 14 different stations at 0 - 30 m depth. Quadrat sampling (20x20 cm) and photo-quadrat method was applied. As a result of this study, total of 18 taxon species and sub species have been identified: Red algae (5 taxon, Rhodophyta), brown algae (5 taxon, Ochrophyta), green algae (6 taxon, Chlorophyta) and seagrasses (2 taxon Tracheophyta). 3 of the species determined in the study region are egzotic originated (Caulerpa racemosa var. [lamourouxii] f. requienii (Montagne) Weber-van Bosse 1913, Caulerpa taxifolia var. distichophylla (Sonder) Verlaque, Huisman & Procaccini in Jongma et al. 2013 ve Halophila stipulacea (Forsskål) Ascherson in Anon. 1867). Invasive species are among the most important factors threatening marine biodiversity. The entry of non-native and invasive species into a new ecosystem is described as "biological occupation" or "biological contamination". Migration of non-native and invasive species has been accelerated by the human activities and the native communities in the migration-receiving regions are under threat to lose their natural structure against the rapid dispersion of these species. It is thought that these species have been carried to the region by the ship traffic. There is no adverse effect on the marine ecosystem observed by the exotic species distributed in the study region. Also in this study, the negative impacts of boat activities on the seaweed and seagrass meadows is observed. Anchors and chains of the boats either during anchoring or raising anchor separates the seagrasses with weak rhizome structures from substratum. Moreover, turbulence occurring during anchor dragging causes sediments rise into the water column and cover the leaves of the seagrass impacting the growth.

ENVIRONMENTAL FACTORS AFFECTING THE STRENGTH CHARACTERISTICS OF MODIFIED RESIN MORTARS

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ABSTRACT

Resin concretes are composites in which a cement binder has been completely replaced by a synthetic resin. These materials are a good choice for the construction industry, especially in solutions requiring high strength, fast curing and durability. Polymer mortars are mainly used for the manufacture of industrial floors and prefabricated products such as tanks for aggressive chemicals, sewage pipes, or road and bridge drainage systems, which are now increasingly used, as well as for the repair of damaged concrete structures. In all these applications, the strength and high chemical resistance of the applied material solutions are of key importance. It is particularly crucial to obtain information on how resin composites behave when exposed to aggressive agents over extended periods of time. It is also very important to use waste materials in order to obtain resin composites, as these activities are very well inscribed in the idea of environmental protection and meet the criteria of sustainable construction. The mortars described in this article meet the above principles. The article presents how the compressive strength of glycolysate-modified epoxy mortars, obtained with the use of poly(ethylene terephthalate), changes after they are immersed in 10% sodium chloride solution. Sodium chloride solution was chosen due to the prospective applicability of the tested composites as repair materials used for e.g. bridges or overpasses that are exposed to this salt solution in wintertime. Changes in the properties of the composite samples were monitored over the period of one year. Statistical analysis of the test results was carried out with the use of Statistica program. The module available in the said program called Nonparametric Statistics - Comparing multiple independent samples made it possible to check the monitoring times during which the compressive strength values differed significantly. The obtained results allowed for determining the equation of the function approximating the course of changes in mortar properties. The designated parameters of regression equations can be used to project the properties of composites.

ANALYSIS OF BENDING STRENGTH OF RESIN MORTARS THAT ARE AT RISK OF LONG-TERM EXPOSURE TO ENVIRONMENTAL CORROSIVES

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ABSTRACT

The results the article presents are part of extensive research on new building materials including cement-free polymer composites where the binder is epoxy resin modified with glycolisates obtained from poly(ethylene terephthalate) waste (PET). The investigation conducted confirmed that there is a possibility of using waste materials in the production of mortar. Since they have always been an environmental problem, their utilization will help to apply the principles of sustainable development in the processes of obtaining new materials. The article discusses the results of a study of flexural strength of polymer mortars. Mortar specimens modified with propylene glycol and PET waste based glycolyzate were exposed to a 10% NaCl solution and their strength parameters were then examined after one month, six months and twelve months of immersion in this aggressive medium. The same characteristics were also determined for specimens that were not exposed to the NaCl solution. The results were presented as the trend function. The sections of the curve corresponding to the particular periods of exposure in aggressive medium vary in shape. Due to this, an attempt was made to adjust the spline function to the experimental data. The examination confirmed the usual fact that composites thus obtained show a deterioration in their strength properties which grows with the extension of their exposure to a corrosive medium. However, the chemical corrosion resistance of the mortars under investigation can be considered very good as it is still much higher than that of conventional cement mortars. Even after a year exposure to a corrosive substance, the mortars obtained still show high mean flexural strength values which equal about 30 MPa.

ACCIDENT RISK ANALYSES FOR ISTANBUL AND ÇANAKKALE STRAITS (TURKEY)

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ABSTRACT

Maritime transportation an plays important role in the world. Commercial transport and navy are international maritime activities among different countries. These activities can be easier and faster than thanks to the role of straits and channels. Turkey also has crucial importance because of its geographical location. The Turkish Straits are a series of internationally significant waterways as connecting Mediterranean Sea and Black Sea. They consist of the Canakkale Strait, the Sea of Marmara, and the Istanbul Strait, all part of the sovereign sea territory of Turkey and subject to the regime of internal waters. They are conventionally considered by the boundary between the continents of Europe and Asia. Because of this geographical importance, all kind of huge sized vessel activities and high volumed cargo transportation always keep going in this waterway. On the other hand, The more maritime activities grow the more accident risks increase. So, we examine that accident risks on Istanbul and Canakkale Straits and we analize risk analyses for them. In the context of the study, one can see general information of the Turkish Straits and the regulatory regime. In addition, tables are applied for vessel movement on Turkish Straits by years in detail in order to sense variation of the vessel. Risk analyses may also be described in sections with many variables. This paper outlines ship accidents and the risk analysis of ship accidents is applied and resulted for Turkish Straits. The last chapter is about the Vessel Traffic Service (VTS) System in the Turkish Straits.

THE USE OF A DECISION-MAKING MODEL IN PLANNING OF A MEDICAL WASTE MANAGEMENT SYSTEM

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ABSTRACT

This paper describes the optimization study aimed to analyse the impact of the parameter describing the degree of reduction of medical waste in incineration (wwp) and changes in the unitary cost of transportation of medical waste (Kij) on the value of the economic efficiency index (E). The study was conducted on the example of the analysis of medical waste management system in north-eastern Poland, in the Podlaskie Province. With the assumed technical and economical parameters of the system the operating range of tests, performed as part of the optimization study was divided into two stages. In the first stage, the lowest cost of operation of the system was calculated. The second stage, in runs 2-13 - effect of changing parameter describing the degree of reduction of medical waste in the process of thermal treatment of waste, expressed as the coefficient of the output - wwp in the range from 15 to 40% and changes in the unitary cost of transportation of medical waste I and II in the test period in the range from 10 to 100%, to obtain an optimal solution. With the adopted wwp = 40% and 100% increase in the unitary cost of transporting waste for runs in the two stage an increase of 9.7% of the rate of the economic efficiency index.

USING OXYGEN AND CARBON ISOTOPIC SIGNATURES IN ORDER TO INFER CLIMATIC AND DIETARY INFORMATIONS IN ROMAN EDESSA, GREECE

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ABSTRACT

Even though many isotopic studies have been conducted on ancient populations from Greece for the purpose of dietary reconstruction; mostly through carbon and nitrogen isotopic signals of bone collagen, less attention has been given to the utility of apatite signatures (oxygen and carbon) as dietary and palaeoenvironmental tools. Moreover, until recently the isotopic signal of tooth enamel for both the purposes of environmental and dietary reconstructions has been rarely assessed in ancient Greek civilities. Therefore, the present study aims to provide with novel isotopic information regarding Edessa; a town in Northern Greece, during the Roman period. The current study primarily aims to explore the possible differentiation between the present climatic conditions in Edessa in relation to those occurring at the Roman period. Secondly, this study aims to reveal the significant utility of enamel isotopic signatures (carbon and oxygen) in palaeoenvironmental and palaeodietary studies regarding ancient human remains. The isotopic analyses have been conducted at the Stable Isotope and Radiocarbon Unit of INN, NCSR "Demokritos". The population of Roman Edessa (2nd-4th c. AD) consists of 22 individuals, providing with 19 bone samples and 16 enamel ones. The mean enamel oxygen value is at -7.7 ±1.1 ?, the bone apatite mean oxygen value at -9.2 ±1.9 ?, and finally the mean carbon enamel value is at -11.7 ±1.2 ?. Oxygen values probably indicate that Edessa had a cooler climate during the Roman times in relation to present conditions, even though more research should be carried out in order to be more certain. In addition, the possible existence of non-local individuals has been revealed through the oxygen teeth enamel-bone apatite spacing. Finally, the carbon enamel signature has pointed out possible differentiations between the adult and the juvenile diet. Based on Edessa's findings, the stated study strongly encourages the enamel oxygen and carbon isotopic signals as palaeoclimatological and palaeodietary tools respectively.

USING OXYGEN ISOTOPIC VALUES IN ORDER TO INFER PALAEOCLIMATIC DIFFERENCES BETWEEN NORTHERN AND CENTRAL-SOUTHERN GREECE

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ABSTRACT

Even though isotopic analyses have been extensively implemented on human skeletal remains for the purpose of dietary reconstruction, less attention has been given to the ingested water and thus to the investigation of palaeoclimatic conditions. In particular, oxygen isotopic fingerprinting has never been applied on human skeletal remains from Greece for the abovementioned purpose before. The basic aim of the present study is to compare climatic conditions from two ancient populations, deriving from two different ecological locations; Edessa (Greek Macedonia; 2nd-4th c. AD) and Thebes (Sterea Hellas, 13th-14th c. AD). Oxygen values in Edessa are at -7.69 ±1.13 ? and -9.18 ±1.88 ? for tooth enamel and bone apatite respectively. On the other hand oxygen signals in Thebes are at -5.8 ±2.16 ? and -9.23 ±1.3 ? for the enamel and bone apatite respectively. The utility of oxygen isotopic signatures for the purpose of palaeoclimatic investigation lies on the fact that the ratio of 18O to 16O of meteoric precipitation, expressed as ?18? per mill (?), relative to the international standard (vSMOW) varies geographically by temperature, humidity, evaporation, distance to the sea, altitude and latitude. Therefore, results as expected, point out that Edessa do presents more negative enamel isotopic values in relation to Thebes, however the noted difference is not observed for the bone apatite samples. The lack of bone apatite differentiation between sites could be attributed to cultural diversity (particularly in Thebes), shift in dietary habits due to migration or social status, climatic fluctuations within each site or to possible diagenetic alteration of bone apatite samples.

EXPERIMENTAL AND MODEL STUDIES OF MESO-SCALE PROCESSES OF ATHROPOGENIC ATMOSPHERIC EFFECTS ON LAKE BAIKAL ECOSYSTEMS

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ABSTRACT

The south part of the Lake Baikal is surrounded with several large industrial centres such as Irkutsk, Angarsk, Ulan-Ude having huge coal power plants (CPP) as energy sources. The purpose of this research is to clear a possible influence of CPP emission on pollution of Baikal's nature via the atmosphere. During 2015-2016 years lengthy measurements with the use of automatics high time resolution (minutes) gas analysers have shown that at the South Baikal periodically the high concentrations of sulphur and nitrogen oxides can be registered, which are caused by meso-scale atmospheric transfers from large regional CPP located in 60-100 km from Baikal (Obolkin et al., 2016). Most significant transfers of atmospheric pollutants at so long distance are connected with atmospheric phenomena "low level atmospheric jet" (300-500 m. height) which transfer CPP plumes without any essential dissipation. More often such transfers happen in winter season and in night time in summer. Concentrations of sulphur and nitrogen oxides in Baikal atmosphere during those transfers can reach some tens and hundreds μg/m3. Besides direct air pollution such transfers can acidify atmospheric depositions over the lake, mainly by HNO3 formation due to reactions of nitrogen oxides with tropospheric ozone. The anthropogenic ion NO3- appease as an extra bio-genic income to the lake ecosystem. During summer season of 2016 the spatial distribution of main pollutants (SO2 , H2S, NO2, NO, CO2) in the Baikal atmosphere was studded from a board of research vessel. Spatial resolution was about one measurement per 300 meter of the way. Over most parts of the lake area very low concentrations (near zero) of all pollutants had been prevailed. However in some cases, usually in early morning, some limit areas (about tens square km.) with significant concentrations of SO2 and NOx were found, which were connected with night transfer of emission plume from remote CPP. These instrumental studies were complimented by mathematical simulations of the propagation and transformation of atmospheric pollutants. The non-liner non-stationary numerical model of turbulent diffusion of admixtures was used (Arguchintsev, 1994; Arguchintsev, Makukhin, 1996). Some numerical experiments were conducted with the aim to estimate processes of transfer, transformation and deposition of sulphur and nitrogen compounds from main regional sources. Calculated results by quality and quantity are coincided with results of field measurements. The results received can be helpful for strategies of Lake Baikal nature conservation.

SOURCE, SUPERGENE ENRICHMENT AND GEOCHEMICAL PARTITIONING OF SILVER IN SOILS OF THE SIERRA DE ARACENA NATURAL PARK (SPAIN)

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ABSTRACT

Silver (Ag) is a rare, but naturally occurring, non-essential metal that can be highly toxic at trace levels. Mediterranean forest soils of the Sierra de Aracena Natural Park, in SW Spain, are highly enriched in Ag and other potentially toxic elements, notably Zn, Pb, Cd and Sb, by supergene alteration of sulfide-bearing parent rocks. The data from this study provide evidence that Ag was originally bound to reactive sulfosalt minerals, such as freibergite (Ag6Cu4Fe2Sb4S13), pyrargyrite (Ag3SbS3) and stephanite (Ag5SbS4), residing in carbonate-hosted sedimentary exhalative ore deposits. At the early stages of weathering, geoavailable Ag was easily liberated from the mineralized bedrock through oxidative dissolution reactions, and then transferred into the soil, thus reaching anomalously high concentrations. The total content of Ag measured in surface soil samples by ICP-MS ranged widely from 1.37 to 154 mg kg-1, with an average grade of 25.3 mg kg-1, while in the subsurface layer (20-40 cm) it ranged from 1.31 to 43.0 mg kg-1, with a mean of 10.2 mg kg-1. This clue is indicative of a potentially economically mineable resource taking into account that the Ag content of surface soils ranges between 0.01 and 5 mg kg?1 on a world-wide basis. The metal fraction available for plant uptake or leaching to groundwater, as predicted by single extraction with 0.01 M CaCl2, was found to be negligible (<0.10%) due to the low activity of dissolved and exchangeable ion (Ag+) in soil solution, while the potentially available fraction of Ag, assessed after extraction by 0.05 M EDTA, usually accounted for less than 3,2% of its total concentration in soil. In addition, Ag was analytically partitioned into residual and labile fractions, using a five-step sequential extraction procedure optimized for iron-rich soils, notably crystalline iron oxy-hydroxides. The findings conclusively show that the vast majority of Ag is bonded to residual (90%) and reducible (9%) phases, suggesting that it occurs as a native element (Ag0), although iron oxy-hydroxides also played a role in the metal accumulation. However, in some samples, considerable proportions of Ag (up to 60%) seem to be stored in the oxidizable fraction, indicating association with secondary sulfide, probably argentite (Ag2S), in the remnants of the supergene enriched zone.

THE ADVANTAGE OF A MULTI-DISCIPLINARY APPROACH IN ORDER TO ENHANCE THE EFFICIENCY IN ENVIRONMENTAL PROTECTION ON URBAN-INDUSTRY AREAS

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ABSTRACT

In the urban-industrial areas there are often waste lands transformed or created by human activity. One example are the coal mine heaps which are a constant element of the landscape of all mining centres in Europe including Upper Silesia, Poland. Many researches and long-lasting observations on permanent study plots enabled to get knowledge about mechanisms of vegetation development on habitats that were created by men. In such habitats formed "de novo" it is possible to follow many spontaneous processes making these sites a kind of huge "biological experiment". Since a quick development of a variety of scientific methods from different disciplines, it is possible to gather a huge amount of precise data on organisms and their environment. They include data on abiotic factors (moisture, temperature, light, content of available compounds, pH, salinity), floristic composition, biological interactions (e.g. mycorrhiza) and physiological conditions of organisms (biomass, enzymatic activity). These data can be gathered in the form of databases that have both time and spatial dimension. Moreover, the development of analytical techniques enable to query complex databases to unveil crucial relations between organisms and abiotic factors. Spatial analyses, mathematical modelling as well as data mining methods, are considered strategic tools to assist decision-making process in order to undertake proper reclamation plans. Ecological niche modelling (ENM) plays extremely important part in ecological research since it enable to predict abiotic conditions in a spatial scale and detect habitats that are optimal for organisms or communities. During field studies a huge amount of data was collected from the mining area of the Upper Silesia industrial district. These included floristic composition of patches, biomass, arbuscular mycorrhiza, physico-chemical soil conditions, soil enzymatic activity. Furthermore satellite images were obtained by remote sensing (LIDAR laser scanning, WorldView-2 multispectral imagery series). These data enabled to elaborate a model of vegetation of coal mine heaps that included abiotic factors as well as biotic interactions, anthropogenic disturbances and some variants of ecosystem modification.

RISK ASSESSMENT OF HEAVY METAL POLLUTION IN SOILS OF THREE TYPICAL MINING AREAS IN YUNNAN PROVINCE, CHINA

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ABSTRACT

This paper aims to study three main metal mining areas in Yunnan Province, to summarize and analyze the heavy metal pollution situation in each mining area, and to assess the ecological risk of the mining areas. The results showed that heavy metal pollution existed in different regions of the three mining areas with pollution elements of Cd, As, Cu, Pb, Zn. Risk level, besides ZhenYuan mining area (class C), for the other two areas was class D, with Beichang mining area in Lanping as the most serious polluted mining area.

MODES AND EXPERIENCE OF GREEN MINE CONSTRUCTION IN YUNNAN, CHINA: CASE STUDIES

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ABSTRACT

Yunnan is one of most important provinces with mineral resources and exploration in China. Meanwhile, Yunnan is Chinese ecological protective screen and try to be Pacesetter of ecological civilization. However, mining industry always disturbs ecological environment seriously. So green mine construction is inevitable and the best choice for Yunnan. In this paper, achievement of green mine construction in Yunnan was summarized. Then the paper takes two mines from Dahongshan and 4 mines from Yunnan Phosphate Chemical Group CO., LTD (YPC for short) as case studies. Technological innovation in Dahongshan Fe Mine and Dahongshan Cu Mine guarantees their success of green mine construction. Land rehabilitation and harmonious community are highlights of 4 mines from YPC. These modes and experience could be referential to construct green mine.

REVIEW OF CARBONATE BRECCIA GENETIC CLASSIFICATION IN WEST HILL, BEIJING, CHINA

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ABSTRACT

This paper summarizes genetic types of carbonate breccia in West Hill, Beijing, and divides carbonate breccia into three general types and 15 sub-types. The three general types include sedimentary breccia, non-sedimentary breccia and breccia with unclear genesis. Among them, sedimentary breccia includes gravity flow breccia, avalanche breccia, reef front collapse breccia, storm breccia, seismite breccia and weathered residual breccia; non-sedimentary breccia includes karst breccia, gypsum breccia, fault breccia, fluid dynamic breccia, pressure solution compaction breccia and glaciers breccia; and breccia with unclear genesis mainly includes leopard breccia. The genetic classification proposed in this paper also has its limitations. For example, not all types of carbonate breccia are covered by the genetic classification. The 14 types of carbonate breccia discussed in this paper are more commonly seen. Some types, which are not so commonly discussed, such as impact breccia formed by meteorolite, are not included in this paper. Besides, the issue of concept overlapping calls for further research.

ANALYSIS ON HEAVY METAL DISTRIBUTION IN OVERLYING DEPOSIT AND POLLUTION CHARACTERISTICS IN RIVERS AROUND DAHONGSHAN DELAFOSSITE IN YUNNAN PROVINCE, CHINA

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ABSTRACT

Dahongshan delafossite mine in Yunnan Province was endowed with the title of “National Green Mine Pilot” by Ministry of Land and Resources in April 2013. In order to verify the implementation effects of the green mine and better drive the construction of the green mine by other mine enterprises in Yunnan, the project team investigated overlying deposit in rivers around the Dahongshan mine in the wet season (August) of 2016, investigated mine enterprises, and applied the Potential Ecological Risk Index to evaluate potential ecological hazards of heavy metal pollutions in overlying deposit. The results showed that all sampling points were smaller than 105, indicating the lower ecological hazard degree.

ANALYSIS ON HEAVY METAL DISTRIBUTION IN OVERLYING DEPOSIT AND POLLUTION CHARACTERISTICS IN DRAINAGE BASIN OF XIAOJIANG RIVER IN DONGCHUAN DISTRICT, YUNNAN, CHINA

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ABSTRACT

The distribution characteristics of heavy metal(Cu, Zn, As, Pb and Cd) content in overlying deposit in Xiaojiang River is analyzed in this thesis, and potential ecological risk index is adopted to evaluate the potential ecological risk of heavy metal pollution in the overlying deposit. Results indicate that the heavy metal(Cu, Zn, As, Pb and Cd) content in overlying deposit in Xiaojiang River all has exceeded standard, especially the content near diggings which is much higher than the national first standard value. And this will affect the bottom mud and river system of Jinsha River to some extent. Cu and Cd are the key pollutants and should be taken as the key object of study. It can be seen from comparison between samples in wet season and that in dry season that pollutants in bottom mud will be released due to the effect of pH value, and secondary pollution of the river will be caused.

THE STUDY ON CONTROLLING FACTORS OF FORMATION AND EVOLUTION OF EARTH FOREST IN YUANMOU AREA

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ABSTRACT

Earth forest is a unique water erosion landform, which plays an important role in the Quaternary geological research and has a high scientific and research value. The tectonic movement made the Yuanmou Formation go through a long process of sedimentation. Then, Yuanmou Basin turned into a gap uplift from the fault depression, while the lifting effect of the new tectonics increases the ground slope. During the strong undercutting of the Jinsha River, the surface water scours and erodes along the weak tectonics surface to form criss-crossing ditches. With time, these ditches will become earth pillars and earth forest. The iron cementation layer on the top of the earth-pillar prevent the earth-pillar from erosion of surface water, and keep the stability of the earth-pillar. Because of the coarse-grained deposition layer by multiple sedimentary cycles, the strength of the earth-pillar has been strengthened. At the same time, the structure makes it easy to form calcareous and argillaceous cementation layer at the lower part of the pillar, which plays the role of self-protection and self-repair. The Yuanmou basin is hot in summer and warm in winter. The area is generally arid and the amount of precipitation is too concentrated. In the rainy season, the gully develops very fast, which provides favorable conditions for the infiltration and erosion of precipitation. Due to drought and inadequate rain in the dry season, weathering and erosion effect on the earth pillar almost does not work, so the earth pillar can stand for a long time. Therefore, the special climate conditions in Yuanmou Basin are all favorable to the formation, development and preservation of the earth forest. Human activities cause water and soil erosion, at the same time objectively accelerate the formation and disappearance of the earth-pillar. The set of strata which formed the earth forest have great difference from the strata of Yuanmou Formation, so the research on the strata of earth forest should be deepened.

CO-LIQUEFACTION OF ELBISTAN LIGNITE WITH BIOMASS: EFFECT OF BIOMASS TYPE, WASTE TO LIGNITE RATIO AND SOLID TO LIQUID RATIO

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ABSTRACT

Most coal hydrogenation processes require a large quantity of hydrogen. Generally a coal derived liquid such as anthracence oil was used as a hydrogen donor solvent. Tetralin, partially hydrogenated pyrene, phenantrene and coal-derived solvents, which contain hydroaromatic compounds, are efficient solvents to donate hydrogen. In an attempt to reduce the high cost of hydrogen, part of the hydrogen was replaced by a low cost hydrogen donor solvent. This must be hydrogenated during or before the process and recycled. To reduce the cost of hydrogen donor vehicles instead of liquids recycled from the liquefaction process or several biomass types, industrial by products, liquid fractions derived from oil sands bitumen were successfully used to solubilize a coal from the past. In an attempt to reduce the high cost of hydrogen, part of the hydrogen was replaced by a low cost hydrogen donor solvent. However when hydrogen is supplied from the hydroaromatic structures present in the solvent, the activity of coal minerals is too low to rehydrogenate the solvent in-situ. Nevertheless, a decrease of using oxygen, in addition to enhanced usage of the hydrogen supply by using various waste materials might lead to a decrease of the cost of the liquefaction procedure. So instead of using tetralin another feeding material such as biomass is becoming another solution improving hydrogen donor substances. Most of the liquefaction process were carried out in a batch reactor, in which the residence time of the liquefaction products is long enough to favor the retrogressive reactions, early studies which are related to liquefaction of coal with biomass generally focus on the synergetic effects of coal while biomass added. Early studies which are related to liquefaction of coal with biomass generally focus on the synergetic effects of coal while biomass added. Alternatively, to understand the hydrogen transfer from biomass to coal, in this study, Elbistan lignite (EL) with manure, tea pulp and waste plastic liquefied and to understand hydrogen quantity change after liquefaction, (H/C)atomic ratio of products obtained. Due to the highest oil conversion of manure biomass and highest (H/C)atomic ratio results show manure is the favourable biomass for EL amongst the other biomass used. And liquid/solid ratio optimized. About high total conversion of oil products the optimum ratio obtained as 3/1. And also EL with manure liquefied with the waste to lignite ratio between 1/1 to 1/6. As a result, by thinking about the yield values obtained, the optimum waste to lignite ratio found to be 1/1.

CO-LIQUEFACTION OF ELBISTAN LIGNITE WITH BIOMASS: EFFECT OF CATALYST CONCENTRATION

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ABSTRACT

The hydrogenation of coal by molecular hydrogen has not been appreciable unless a catalyst has been used, especially at temperatures below 500 oC. Conversion under these conditions is essentially the result of the pyrolysis of coal, although hydrogen increases the yield of conversion due to the stabilization of radicals and other reactive species. Curtis and co-workers has shown that highly effective and accessible catalyst are required to achieve high levels of oil production from the co-processing of coal and heavy residua. In their work, powdered hydrotreating catalyst at high loadings an oil-soluble metal salts of organic acids as catalyst precursors achieved the highest levels of activity for coal conversion and oil production. Red mud which is iron based catalyzed has been used in several co-processing studies. It was used as an inexpensive sulfur sink for the H2S evolved to convert Fe into pyrrohotite during coal liquefaction. In this study, Elbistan lignite (EL) with manure liquefied using red mud as a catalyst with the range of concentration from %0 to %12. The main point of using red mud catalyst is to enhance oil products yield of coal liquefaction which deals with its catalytic activitiy. On the other hand, in this study, red mud acts on EL liquefaction with manure as a catalyst and represents an environmental option to produce lower sulfur content oil products as well.

CO-LIQUEFACTION OF ELBISTAN LIGNITE WITH BIOMASS: EFFECT OF REACTION TIME AND TEMPERATURE

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ABSTRACT

Most of the liquefaction process were carried out in a batch reactor, in which the residence time of the liquefaction products is long enough to favor the retrogressive reactions. To minimize retrogressive reactions, the liquefaction of coal was carried out in a flowing solvent reactor in which a fixed bed of coal is continuously permeated by hot solvent. Solvent flowing through the coal bed carries the liquefaction products out of the reactor. Unlike experiments carried out under similar conditions in a batch reactor no increase in solid residue is observed during long time high temperature runs in the flowing solvent reactor. There is a greater appreciation of the importance of retrograde, or polymerization, reactions. If the free radicals formed when coal breaks down are not quickly capped with hydrogen, they react with each other to form large molecules that are much harder to break down than the original coal. Reaction time impacts both the co-liquefaction cost and the product yield. So as to study this idea, the experiments of Elbistan lignite (EL) with manure co-liquefaction carried out by changing the reaction time from 30 to 120 minutes. As a result, the greatest oil products yields obtained at 60 minutes. Therefore, by thinking about the oil products yield values acquired, the optimal reaction time was discovered to be 60 minutes. And, EL with manure liquefied with the temperature of 350 oC and 400 oC. Above 425 oC didn't examine since solvent (tetraline) loses its function after 425 oC. The obtained optimum temperature found 400 oC due to higher total conversion of liquefaction products and also oil+gas yields.

RESEARCH ON HEAVY METAL POLLUTION IN ROADSIDE SOIL CAUSED BY VEHICLE EXHAUST

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ABSTRACT

Various causes existing lead to heavy metal pollution in farmland soil. This research focuses on heavy metal pollution in roadside soil caused by vehicle exhaust fumes. Firstly, representative highway profile is selected for the research. Along the profile, soil samples are drawn in different distances for the analysis of specified heavy metals in laboratory.(Secondly,) Applying graphics and statistics, the relationship between level of heavy metals and the distance from the highway is researched. As the result showing, there exists good positive correlation between the level of heavy metals of Pb and Cr in roadside soil and the distance from the highway.

ANAEROBIC DIGESTION PERFORMANCE IN THE ENERGY RECOVERY OF KIWI RESIDUES

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ABSTRACT

World production and trade of fruits generate losses in the harvest, post-harvest, handling, distribution and consumption phases, corresponding to 6.8% of total production. These residues present high potential as a substrate for the anaerobic digestion process and biogas generation. Thus, the energy valuation of the agro-industrial residues of kiwifruit production was evaluated by anaerobic digestion, aiming at optimizing the biogas production and its quality. Ten assays were carried out in a batch reactor (500 mL) under mesophilic conditions and varying a number of operational factors: different substrate/inoculum ratios; four distinct values for C: N ratio; inoculum from different digesters; and inoculum collected at different times of the year. The following parameters were used to control and monitor the process: pH, alkalinity, volatile fatty acids (VFA), volatile solids (VS) and chemical oxygen demand (COD). Among the tests performed, the best result obtained for the biogas production corresponded to the use of 2 g of substrate and 98 mL of inoculum of the anaerobic digester of the Wastewater Treatment Plant (WWTP) of Bragança, with addition of 150 mg of bicarbonate leading to a production of 1628 L biogas.kg-1 VS (57% methane). In relation to the biogas quality, the best result was obtained with 20 g of substrate and 380 mL of inoculum from the anaerobic digester sludge of Ave WWTP (plus 600 mg of sodium bicarbonate), presenting a value of 85% of CH4, with a production of 464 L biogas.kg-1 VS.

TREATMENT AND ENERGY VALORISATION OF AN AGRO-INDUSTRIAL EFFLUENT IN UPFLOW ANAEROBIC SLUDGE REACTOR (UASB)

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ABSTRACT

The accelerated growth of the population brings with it an increase in the generation of agro-industrial effluents. The inadequate discharge of these effluents significantly affects the quality of water resources. In this way, it becomes important to invest in treatment processes for agro-industrial effluents, particularly low-cost ones. In this context, the present study includes the design and construction of a UASB reactor and optimization of the anaerobic digestion treatment of the raw effluent from chestnut production in the agro-industrial company Sortegel. The efficiency of the system was evaluated through the determination / monitoring of Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD5), Total Suspended Solids (TSS), biogas production rate and quality (% methane). The reactor was fed for 25 weeks and operated under mesophilic conditions (temperature 30-40°C). Different values were tested for the hydraulic retention time (HRT) and volumetric flow rate (QV): 0.66 days (QV=1509 L.m-3.d-1); 1.33 days (QV=755 L.m-3.d-1); 2.41 d days (QV=415 L.m-3.d-1). The average COD removal efficiency reached values of 69%, 82% and 75%, respectively, and simultaneously the associated CBO5 removal efficiency was 84%, 91% and 70%. As regards TSS, removal values were 78%, 94% and 63%. In addition, high methane production rates were obtained, between 2500 and 4800 L CH4.kg-1 COD removed.d-1. For all the hydraulic retention times tested, high concentrations of methane in the biogas were recorded: 66-75%, 70% and 75% for HRT of 0.66, 1.33 and 2.41 days, respectively.

SPATIAL DISTRIBUTION OF ESTIMATED HAZARDOUS EMISSIONS FROM MULTIPLE-SOURCES: A CASE STUDY OF OIL INDUSTRY IN NORTHEASTERN ECUADORIAN AMAZON

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ABSTRACT

The present study investigates upstream oil hazardous emissions capable of human health and environmental degradation, in the North-eastern Ecuadorian Amazon (NEA), an enriched worldwide biodiversity and cultural heritage area. We use GIS to develop a method, build an emission inventory and represent contaminant emissions. We categorized inhomogeneous or incomplete institutional reports and mixed emission sources to estimate discharges from oil spills to soil and water, and black carbon and gas flaring to the atmosphere; from years 2003 to 2012. An homogeneity factor was derived to spatially allocate potential oil spills to point and line sources where data has been defectively reported (p ? 0.082). For airborne emissions we used regional emission factors and several sources for comparison. Our results show oil spills totaled 464 (42.2/yr.) accounting for 10,000.23 Mg, which translate into annual discharges of 909.11 (±1,219.46) Mg. Our maps display potential pollution "hotspots" in Dayuma and Joya de Los Sachas with highest concentrations (13,802kg/km2/yr.). Total airborne emissions of 6,211.62 Mm3, with an average of 776.45 (± 45.45) Mm3per year of gas flared, translates into a range of 3,105 - 4,544Mg black carbon, with an average per year of min=388; max=568 Mg. North to south from Shushufindi and in Joya de Los Sachas receiving highest emissions as per 29.4-148 (kg/m2/yr.). Black carbon varies by up to two and a half orders of magnitude between official and other sources in 2012. We provide supporting information to monitor, improve and prioritize actions for environmental remediation and mitigation in chronically, exposed environments.

RENEWABLE ENERGIES IN FRANCE: WHAT PROSPECTS FOR A LOW-CARBON ECONOMY AND SOCIETY?

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ABSTRACT

France has engaged policies encouraging the development of renewable energies in order to carry out an energetic transition allowing a reduction of greenhouse gas emissions and a decrease of France's contribution to climate change. To stimulate the rise of renewable energy production, France has committed to very ambitious objectives at the national and international level - to reach a share of 23% of energy produced by renewables in 2020 and of 32% by 2030 - and has set up a series of measures destined to simplify and improve the current legal and administrative context ruling renewable energies. This paper evaluates the role renewable energies, which have been put at the heart of a new decarbonised French economy and society, can actually hold within France's efforts to cut down emissions from fossil fuels and to cope with the targets it has intended to reach. If the new law for an energetic transition sets up promising paths for the enhancement of renewable energies on the economic and legal level, the share of renewables in the final French energy consumption mix is facing issues to significantly increase over time. The French renewable energy sector is actually negatively impacted by several political, socio-economic and structural obstacles. Despite a voluntarist official political discourse, measures undertaken at the national level are sometimes ambivalent and paradoxical. In addition, the imposing French nuclear sector still holds an important economic and symbolic image for French stakeholders, which tends to relegate renewable energies to a position of secondary importance. It then seems that the success of the energetic transition relies on France's ability to create a context favourable to renewable energies and to succeed in simplifying regulations and legal schemes for innovative renewable energy projects to be implemented. It also depends on the possibility of finding alternative ways to the strict top-down approach to the current policy-making for renewable energies.

NUCLEAR POWER AS A BASIS FOR FUTURE ELECTRICITY GENERATION

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ABSTRACT

It is well known that electrical-power generation is the key factor for advances in industry, agriculture, technology and the level of living. Also, strong power industry with diverse energy sources is very important for country independence. In general, electrical energy can be generated from: 1) burning mined and refined energy sources such as coal, natural gas, oil, and nuclear; and 2) harnessing energy sources such as hydro, biomass, wind, geothermal, solar, and wave power. Today, the main sources for electrical-energy generation are: 1) thermal power - primarily using coal and secondarily natural gas; 2) "large" hydro power from dams and rivers and 3) nuclear power from various reactor designs. The balance of the energy sources is from using oil, biomass, wind, geothermal and solar, and have visible impact just in some countries. In spite of significant emphasis in the world on using renewables sources of energy, in particular, wind and solar, they have quite significant disadvantages compared to "traditional" sources for electricity generation such as thermal, hydro, and nuclear. These disadvantages include low density of energy, which requires large areas to be covered with wind turbines or photovoltaic panels or heliostats, and dependence of these sources on Mother Nature, i.e., to be unreliable ones and to have low (20 ? 40%) or very low (5 ? 15%) capacity factors. Fossil-fueled power plants represent concentrated and reliable source of energy. Also, they operate usually as "fast-response" plants to follow rapidly changing electrical-energy consumption during a day. However, due to combustion process they emit a lot of carbon dioxide, which contribute to the climate change in the world. Moreover, coal-fired power plants, as the most popular ones, create huge amount of slag and ash, and, eventually, emit other dangerous and harmful gases. Therefore, Nuclear Power Plants (NPPs), which are also concentrated and reliable source of energy, moreover, the energy source, which does not emit carbon dioxide into atmosphere, are considered as the energy source for basic loads in an electrical grid. Currently, the vast majority of NPPs are used only for electricity generation. However, there are possibilities to use NPPs also for district heating or for desalination of water. In spite of all current advances in nuclear power, NPPs have the following deficiencies: 1) Generate radioactive wastes; 2) Have relatively low thermal efficiencies, especially, water-cooled NPPs; 3) Risk of radiation release during severe accidents; and 4) Production of nuclear fuel is not an environment-friendly process. Therefore, all these deficiencies should be addressed in the next generation or Generation-IV reactors. Generation-IV reactors will be high-temperature reactors and multipurpose ones, which include electricity generation, hydrogen co-generation, process heat, district heating, desalination, etc.

PASSIVE RESIDENTIAL HOUSES WITH THE ACCUMULATION OF GROUND AS A HEAT STORAGE MEDIUM

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ABSTRACT

Solar radiation is the primary source of life energy on Earth. The irradiance of the upper atmosphere is about 1360 W/m2, and it is estimated that about 1000 W/m2 reaches the ground. Long-term storage of heat energy is related to the use of a suitable thermal energy carrier. It may be either artificial or natural water tank, or artificial gravel-water tank, or aquifer or soil. It is justified to store the generated energy in large heating systems due to the nature of solar thermal energy. Typically, in such a solution storage space is a large solar collector farm. The reason for this is the proportionally small unit profits, which only in the case of large number of units provides sufficient energy that can be accumulated. It should be noted that Poland, a country located in a temperate and less harsh climate such as Scandinavia and Canada, has a relatively high potential for solar revenue. In the last decade, it has caused mainly small and individual heating installations. However, much of the municipal and industrial economy continues to rely on energy from non-renewable resources. This is due not only to the lack of a high-efficiency alternative to non-renewable energy resources, but also to the thermal state of buildings throughout the country, where old buildings require thermo-modernization. This has the effect of both polluting the environment and the occurrence of smog, as well as pollutants in water and soil. This directly affects the occurrence of civilization diseases and other societal health problems. Therefore, the surplus of thermal clean energy that occurs during the spring and summer period should not only be used on a regular basis, but also stored for later winter use. The paper presents the concept of housing estate, which consists of 32 twin housing units. The solid character of buildings consistently refers to passive construction, and the materials meet the requirements for the passive buildings.

SELECTIVE INTERNAL HEAT DISTRIBUTION IN MODIFIED TROMBE WALL

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ABSTRACT

At present, the requirements for thermal insulation of the external walls in buildings are being increased. There is a need to reduce energy consumption for heating rooms during the winter season. This may be achieved by increasing the thermal resistance of the outer partitions, using solutions that utilize eiher recuperation or solar radiation. The most popular systems include either solar collectors, or heat pump links or ground exchangers. Trombe walls are a very promising passive heating system, which require little or no effort to operate, and may be very convenient in different climate conditions. A typical Trombe wall consists of a masonry wall painted a dark, heat absorbing color and faced with a single or double layer of glass. The principle of operation is based on the photothermal conversion of solar radiation. There are various modifications of Trombe walls. They may improve the energy efficiency in relation to the climate conditions in which they operate. The hybrid solutions are also known. The efficiency of walls is related to the use of proper materials. In Trombe walls the compromise should be sought between the thermal resistance and the ability to distribute heat from the absorbed energy of solar radiation. The paper presents an overview of the most commonly used solutions and discusses its own concept dedicated to the climate conditions of Central Europe.

SUSTAINABLE MINING LAND USE FOR LIGNITE BASED ENERGY PROJECTS

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ABSTRACT

This research aims to discuss complex lignite based energy projects economic viability and its impact on sustainable land use with respect to project risk and uncertainty, economics, optimisation (e.g. Lerchs and Grossmann) and importance of lignite as fuel that may be expressed in situ as deposit of energy. Sensitivity analysis and simulation consist of estimated variable land acquisition costs, geostatistics, 3D deposit block modelling, electricity price considered as project product price, power station efficiency and power station lignite processing unit cost, CO2 allowance costs, mining unit cost and also lignite availability treated as lignite reserves kriging estimation error. Investigated parameters have nonlinear influence on results so that economically viable amount of lignite in optimal pit varies having also nonlinear impact on land area required for mining operation. Results obtained from test model help to investigate mass-energy balance economics and indicates that project is most sensitive to energy (product) price changes. With median scenario of surface cost (land buyout), it can be observed that 1% change in energy price generates 2.5% change in project net value. Similar to power plant efficiency where 1% change in power plant efficiency generates 1.5% change in project net value. In thanks to cloud based calculations of hundreds scenarios with 3D block model processing, cadastral map data and economic parameters, results are also presented as output models from which land area occupied by project can be calculated. In this case, economically viable project may take from even 1.12 km2 up to 1.92 km2. Joint analyses constitute a contribution to investment decision-making and sustainable land use so that no land is used without careful economic analysis.

REVITALIZATION OF LIGHTWEIGHT CLADDING OF BUILDING AND ITS IMPACT ON ENVIRONMENT

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ABSTRACT

The presented study reveals that the revitalization of lightweight claddings installed before 1990 can have a positive impact on the environment and on the reduction of greenhouse gases in particular. The main focus is placed on the revitalization of a structural system known as OD-001, commonly called the 'Boleticky panel' system, which was frequently utilised all around the Czech Republic in the period before 1990. Only revitalization methods utilizing contemporary structural designs and current materials were verified during this study. The 'Boleticky panel' system was the type of façade cladding most frequently installed on administrative buildings in what was then Czechoslovakia. It is a panel system where load-bearing structure of the panel itself consists of closed profiles that are suspended from the building's load-bearing structure. This type of system saw a great deal of use for more than 20 years. From today's point of view, its thermal and technical properties are completely unsatisfactory and the gradual structural degradation of such systems, with a direct impact on their mechanical resistance, has been monitored over the last few years. However, these defects can be completely eliminated by the selection of a suitable type of revitalization. Cladding revitalization can be divided into three main categories. Each category represents a different level of impact on the structure of the above described cladding system. The first category only involves the replacement of windows, while the second consists in the replacement both of the windows and the existing panel sections. The third category of revitalization entails the complete removal of the existing cladding system and its replacement with a new one. The Life Cycle Assessment method (LCA) was used for environmental impact assessment. The aims and intentions of this method are not to search for the most economical or technically perfect product, service or technology, but to find the most environmentally friendly product with properties that can be guaranteed to last throughout its whole service life. The obtained results showed that revitalization has a positive impact on the environment. It can significantly reduce the consumption of energy that is used to heat the building in the winter, and thus reduces greenhouse gas emissions. On the other hand, it will cause a slight increase in the demand for cooling energy in the summer, which is mainly due to the reduction of the air permeability of the structure, making it more difficult to cool the interior of the building down, e.g. during the night, causing inhabitants to make greater use of air-conditioning. However, the revitalization itself, even if this term is taken to include the installation of the new cladding system, its maintenance and its future demolition, has a negligible impact on the environment compared with the old system. Therefore, based on the evaluated data the authors of the presented paper can highly recommend and encourage the revitalization of OD-001 lightweight cladding systems.

MODELING THE FLOW OF QUANTITY AND QUALITY OF MATERIAL IN LIGNITE MINES USING SIMULATION

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ABSTRACT

Boilers in mine-mouth power plants that collect lignite from nearby deposits are built so that the optimum efficiency is achieved for the fuel with parameters corresponding to the average lignite quality parameters in the bed supplying coal to the power plant. Coal with these parameters is considered to be the reference fuel, and through appropriate pricing formulas or contractual requirements, the power plant seeks to ensure that supplied lignite is of expected and stable parameters. This requires active control of the faces advances or coordination of the excavation from many pits so that the averaged boiler feed is characterized by parameters as close as possible to the reference coal. This is not always possible because the spatial distribution of quality parameters in the bed can be very different due to individual conditions. In order to stabilize the variation in spoil mixture, it may be necessary to use bunkers in the mine or in the power plant. Blending process starts earlier, when conveyor belt receives lignite from several excavators - joining coal streams from different sources. As the number of coal levels increases, the blending process becomes more complex, and the difficulties can increase as more bunkers and nodes are added to the system, with the possibility of redirecting the stream to any conveyor in duplicate supplying conveyors chains. Such solutions increase the reliability of supplies, but make it difficult to control the quality of lignite in the coal stream. The paper describes an attempt to model variation in quantity and quality of lignite on conveyor belts using FlexSim program. The experience gained from implementing the DISIRE project to track the quality of ore in the copper ore mine was utilized.

THE DESTRUCTION METHODS FOR POLLUTION OF PETROLEUM AT SEA

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ABSTRACT

Nowadays , it can be clearly seen that petroluem has been added to people needs like feeding, clothing, sheltering. Petroluem is almost the base element for humans life. So,the petroluem uses for wide range places as energy. The petroluem consumption reaches to 3,5 billion tonnes yearly in the world. This quantity illustrates that 40 percentage within all energies. The petroluem which is worth for our world, a lot of methods are used for transportation to people. The most effects way to transport for people , it is shipping. However, it consider that while petroluem was carrying by ships, it should be contamination of seas because of crashing, grounding, sinking, firing like this. After that , sea pollution able to occur. How we need to petroluem for our fundamental thing, also we need to our seas. If we can prevent to sea pollution, we will save human and marine species. This working explains that the destruction methods for pollution of petroluem at sea. Every methods are individual, in additon the human factor is the most important for this work. If the countries are gather to for same intention for working same incident, then it will be achievement. Our intention must be as if the pollution never being experienced and leaving livable seas for future generations.

COMPARISON OF HOUSING CONSTRUCTION DEVELOPMENT IN SELECTED REGIONS OF CENTRAL EUROPE

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ABSTRACT

In fast-growing countries, the economic growth, which came after the global financial crisis, ought to be manifested in the development of housing policy. The development of the region is directly related to the increase of the quality of living of its inhabitants. Housing construction and its relation with the availability of housing is a key issue for population overall. Comparison of its development in selected regions is important for experts in the field of construction, mayors of the regions, the state, but especially for the inhabitants themselves. The aim of the article is to compare the number of new apartments with building permits and completed flats with final building approval between selected regions by using a mathematical statistics method - "Analysis of variance ". The article also uses the tools of descriptive statistics such as a point graph, a graph of deviations from the average, basic statistical characteristics - rate level and variability. Qualitative factors influencing the construction of flats as well as the causes of quantitative differences in the number of started and completed apartments in selected regions of Central Europe are the subjects of the article's conclusions.

AN ATTEMPT TO DEVELOP GEOTHERMAL POWER PLANT AT BAKRESWAR HOT SPRING SITE INDIA

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ABSTRACT

Nowadays the developed and developing countries are paying attention toward power generation from renewable and green energy resources. The Earth's internal heat (Geothermal energy) is such a promising source for power generation. 24 countries across the globe already developed geothermal power plant. However India is still ignoring this technology even after having vast geothermal resources in the country. There are more than 340 hot springs in India and these hot springs could be classified in different geothermal provinces based on the enthalpy of the system. Indian geothermal systems are mostly low enthalpy and intermediate enthalpy geothermal systems. Bakreswar-Tantloi geothermal area (West Bengal-Jharkhand), India seem to be promising. Here we discussed about possibility of harnessing geothermal power from Bakreswar hot spring site. The geothermal waters and gas samples were collected from the cluster of hot springs at Bakreswar-Tantloi to study the geochemical-geophysical characteristics. The spring temperature found to be 69 0C, however the estimated reservoir temperature (using geothermometry) was 139 0C. It is found that the said area is a liquid dominated low enthalpy geothermal system. Concentration of various gases in hot springs and geechemical-geophysical characteristics of the hydrothermal water remain unaltered for many years. Henceforth, the heat reservoir did not experience any influence of terrestrial phenomena in last several years and can be exploited for power generation. Our observation shows that the heat source at Bakreswar is reliable and that can be exploited for long time. Since our study area belongs to low temperature geothermal systems, the binary type Kalina cycle power plant will be suitable for production of geothermal power even after having lower efficiency. Ammonia-water mixture (organic fluid) could be utilized as working fluid for turbine to lessen corrosion of the turbine blades. This may escalate the life time of the turbine. Moreover, ammonia-water mixture has low boiling temperature and therefore, the system will experience less heat loss due to lower temperature drop between the heating fluid and the evaporating mixture in the turbine. Overall thermal efficiency using organic fluid varies in the range of 12% -53%. It is planned to develop a pilot scale plant based on borehole (~ 200-300 m deep) at Bakreswar. Moreover helium and argon could be extracted from the Bakreswar geothermal area during geothermal power harnessing.

CHARACTERISATION AND PRODUCTION OF ECO-ENZYME FROM FERMENTATION OF AGRO WASTE AND ITS INFLUENCE ON PALM OIL MILL SLUDGE SOLUBILISATION

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ABSTRACT

The palm oil mill sludge (POMS) generates in large quantity from the treatment of palm oil mill effluent is one of the potential surface and ground polluters. Before POMS can be disposed of, it has to be stabilized sufficiently to reduce its organic content and odour problem. Anaerobic digestion is the most common method used for sludge stabilization but it has limitation in terms of long retention times and low overall degradation efficiency of the organic matter. Eco-enzyme is a liquid which is economically produced from fermentation of organic waste with water and molasses. In this study, eco-enzyme was produced from agricultural waste such as pineapple, orange, tomato, and mango dregs and the characteristics of eco-enzyme were investigated. Therefore, this study focus on the usage of eco-enzyme as one of the biological pre-treatment method to solubilise POMS before it is further treated in anaerobic digestion system. The solubility of POMS was performed with eco-enzyme at different pH (pH 3.5 and pH 7) and time interval. The eco-enzyme produced from three months fermentation with mixture of molasses, agro wastes and water in the ratio of 1: 3: 10 was found to be acidic and contained a large amount of solids material which resulted in high organic content. Besides, this eco-enzyme also possesses protease, lipase and amylase activity. This study shows that the presence of hydrolytic enzymes activity in the garbage enzyme causes solubilisation of volatile suspended solids and total suspended solids ranging of 14-17%. Besides, increases the solubilisation of sludge in COD about 91% to 97% and TAN from 42% to 46% with increasing treatment time. The eco-enzyme with pH 7 shows slightly higher solubilisation in sludge when compare with pH 3.5. Hence, it can be suggested that the eco-enzyme can be used directly without adjusting the pH in future study. Generally, these findings suggested that eco-enzyme solutions have the capability to solubilise complex insoluble organic compounds to soluble organic compounds, which can be subsequently treated by anaerobic microbes if further anaerobic process.

INFLUENCE OF ECO-FRIENDLY MINERAL ADDITIVES ON EARLY AGE COMPRESSIVE STRENGTH AND TEMPERATURE DEVELOPMENT OF HIGH-PERFORMANCE CONCRETE

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ABSTRACT

High-performance concrete (HPC) which contains increased amount of both higher grade cement and pozzolanic additives generates more hydration heat than the ordinary concrete. Prolonged periods of elevated temperature influence the rate of hydration process in result affecting the development of early-age strength and subsequent mechanical properties. The purpose of the presented research is to determine the relationship between the kinetics of the heat generation process and the compressive strength of early-age high performance concrete. All mixes were based on the Portland Cement CEM I 52.5 with between 7.5 % to 15 % of the cement mass replaced by the silica fume or metakaolin. Two characteristic for HPC water/binder ratios of w/b = 0.2 and w/b = 0.3 were chosen. A superplasticizer was used to maintain a 20-50 mm slump. Compressive strength was determined at 8h, 24h, 3, 7 and 28 days on 10x10x10 cm specimens that were cured in a calorimeter in a constant temperature of T = 20°C. The temperature inside the concrete was monitored continuously for 7 days. The study determined that the early-age strength (t<24h) of concrete with reactive mineral additives is lower than concrete without them. This is clearly visible for concretes with metakaolin which had the lowest compressive strength in early stages of hardening. The amount of the superplasticizer significantly influenced the early-age compressive strength of concrete. Concretes with additives reached the maximum temperature later than the concretes without them.

AN ASSESSMENT OF RENEWABLE ENERGY SOURCES & MUNICIPAL SOLID WASTE FOR SUSTAINABLE POWER GENERATION IN NIGERIA

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ABSTRACT

The demand for Energy in most Sub-Saharan African countries has become unimaginable despite its high potential of natural and renewable resources. The deficit has impeded the regions' economic growth and sustainability. Nigeria as a nation is blessed with fossil fuels, abundant sunlight, hydro, wind and many among others but yet the energy output to its population (185 million) still remains less than 4000MW. Currently, the clamour for an alternative but renewable energy source is the demand of the globe but it is quite expensive to achieve the yield that meets the Nigeria demand. Hence, this study aims at identifying and mapping out various regions with renewable energy potentials. The study also considers municipal solid waste as a consistent and available resource for power generation. Furthermore, this study examines the drawbacks inhibiting the inability to harness these renewable energy generating potentials in full capacity. The study will enable the authorities and other stakeholders to invest and plan on providing a sustainable energy for the people.

LOCAL AND INDIGENOUS KNOWLEDGE REGARDING THE LAND USE AND USE OF OTHER NATURAL RESOURCES IN THE ASPIRING RIO COCO GEOPARK

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ABSTRACT

There is limited number of studies describing the situation and importance of current or potential usage of the local and indigenous traditional environmental knowledge in the region of Northern Nicaragua. To fill this gap, author supported by local team conducted the geo-anthropological research in summer 2017 in this rather neglected Central American region, concretely in the northern area of the aspiring Rio Coco Geopark. The purpose of this research was to identify the local and indigenous knowledge regarding the present and traditional use of natural resources including land use and to analyse the contribution and potential of usage of this knowledge for the local development sustainability. Especially, the assessment to what extent this knowledge could serve for enhancement of the local geotourism sustainability was of high importance. The research process itself was of the same importance as its results, especially the involvement of the local and indigenous people. In this participative research, the young local and indigenous persons obtained training and served as co-investigators who then interviewed representatives of local households. The other field methods included life history of Elders, discussions in the focal groups involving common people from local communities as well as the mapping and photo-documentation of the identified local and indigenous traditional environmental knowledge. As the positive side effect, this research process supported the revival of the community memory and revitalization of its cultural and natural identity. The research findings point out that the more distant and more dispersed are the local settlements the better conserved local and indigenous knowledge regarding the traditional land use and other use of natural resources. Among the best-conserved local and indigenous traditional environmental knowledge in the northern area of the aspiring Rio Coco Geopark was the usage of earth material and plants. The local indigenous people are not expressing and transmitting the spiritual dimension of their traditional environmental knowledge (sacred times or sites, rites, rituals or taboos regarding the traditional land use and other use of natural resources) anymore because they had been experiencing the continuous repression realized by the dominant (colonial) society in the past. The majority of identified traditional land use and use of the other natural resources as well as related traditional environmental knowledge in the researched northern region of the aspiring Rio Coco Geopark seems to be more sustainable than the present land use practices and the use of natural resources generally for agriculture, medicine, constructions etc. The local communities should dedicate much more attention and efforts to conserve, transmit and use this local and indigenous traditional environmental knowledge and thus (among others) to improve the sustainability management of this emerging geotourism destination.

THE OPEN SPACE BETWEEN RESIDENTIAL BUILDINGS AS A FACTOR OF SUSTAINABLE DEVELOPMENT – CASE STUDIES IN BRNO (CZECH REPUBLIC) AND VIENNA (AUSTRIA)

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ABSTRACT

The characteristics of open spaces between residential buildings have, as authors suppose, an impact on the sustainable development of urban areas. Spatial arrangement and accessibility of these spaces, the type and height of surrounding buildings, the quantity and character of greenery, and many more characteristics influence the quality of environment, and the quality of life of local residents. These and further characteristics of the open spaces between residential buildings influence the ecological stability of the area, its hygienic qualities, the intensity and way of using by various social groups, and also the prices of real estates. These qualities indicate the environmental, social and economic sustainability of the urban area. The proposed research methodology assessed specific indicators of sustainability within a range from 0 to 10 points. 5 points correspond to the general standard in the area, 0 points indicates degradation, and 10 points indicate the highest contribution to sustainable development. Observation methods, questionnaire survey, statistical analyses, and methods of measurement were used to determine the values of the given indicators. The paper analyses the impact of the open spaces between residential buildings on sustainability via the case studies performed in the Central European cities of Brno, Czech Republic and Vienna, Austria. Two forms of residential urban structures in the City of Brno in the Czech Republic were selected for analysis – the closed courtyards in the urban block from the 19th century and the open spaces in the housing estates constructed under socialism in the 20th century. The question is, if the different forms of spaces between residential buildings influence the sustainability of urban area and satisfaction of inhabitants in different ways. Complementary case study in Vienna indicates that inhabitants of housing estate in Vienna, as well as inhabitants of housing estate in Brno, highly appreciate the meaning of large green open spaces between buildings. Paper presents results of basic research. The results indicate that the sustainability of open housing estate forms is higher than authors expected.

HEAT RETREAT LOCATIONS IN CITIES - THE SURVEY-BASED LOCATION ANALYSIS OF HEAT RELIEF

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ABSTRACT

The adaptation of cities to climate change effects is one of the major strategies in urban planning to encounter the challenges of climate change (IPCC 2014). One of the fields of climate change adaption is dealing with heat events that occur more frequently and with greater intensity. Cities in particular are vulnerable to these events due to high population and infrastructure density. Proceeding urbanization calls for the existence of sufficient heat retreat locations (HRL) to enable relief for the population from heat in summer. This is why an extensive analysis of HRL is needed. This paper aims at the development of a survey-based location analysis of heat relief by identifying user groups, locations and characteristics of HRL based on a home survey that was conducted in three German cities. Key results of the study show that the majority of the participants of the survey are users of existing HRL, are affected by heat, and perceive heat as a burden in summer. Moreover, HRL that are located in close proximity are preferred by most users while their effect depends on the regional context that has to be considered in the analysis. Hence, this research presents an approach to heat relief that underlines the importance of HRL in cities by referring to selected examples of HRL types in densely populated areas of cities. HRL should especially be established and secured in densely built-up areas of cities. According to results of the survey, most HRL are located in public spaces, and the overall accessibility of HRL turned out to be an issue.

URBAN SPACE AS THE COMMONS (NEW MODES FOR URBAN SPACE MANAGEMENT)

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ABSTRACT

The significant growth of the urban population, globalisation of social eco-systems, fuzzification of the spatial structures, the diversity of actors in spatial development, their power and interest in using the resources including the space, especially in high-density urban areas is creating significant challenges for planning and spatial development. Spatial development is connected with a high concentration of economic activities and population in urban systems. In many cases, rapid processes of urbanisation and suburbanization are approaching the natural spatial/territorial limits, such as the carrying capacity of land, transport and infrastructural systems, absorption capacities of recipients and other (Finka, Ondrejicka, 2016). Growing shortage of space and problems in their accessibility (physical, functional, etc.) leads to growing tension and conflicts among the actors/users of urban spaces and represent the initial phase of space deprivations processes. There is a parallel with "tragedy of commons" as defined by Hardin (1968) and was reinterpreted by many other academics and researchers. Urban space can be clearly interpreted as the common pool resources (commons) or common good for their community of users and relevant actors, so innovative governance modes overlapping defined "tragedy of commons" representing a possible approach for a new concept of urban public spaces management. This paper presents a possible new approach to the management of urban spaces reflecting the current challenges in spatial development based on the theory of commons and innovative governance modes. The new approach is built on innovations in institutional regimes, the algorithm of decision-making and economic expression and interpretation of quality of the space. The theory of the commons as the base source for this approach has been broadly proved in practice and Elinor Ostrom as the author of this theory was awarded by Nobel Prize in 2009.

COMPARATIVE ANALYSIS OF THE PLANNING EDUCATION IN SLOVAKIA AND TURKEY

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ABSTRACT

This study examines the way the planning education is taught and examines in particular the system in Slovakia and in Turkey. The introduction of changing economic systems and planning in the field of education is discussed against these changes. Additionally, the evolution in the role of the planner and how it affects the planning education is discussed. The paper is addressing two countries, Slovakia and Turkey which are facing similar planning problems although they differ in magnitude, political system, planning schools, and so on, the point is to find common themes and to address them from the point of view of both planning education systems. The research aims at finding out what the two countries can learn from each other in the field of planning education. Another aim is to prepare a common ground at the university level for scientific cooperation in the field of planning. This comparative study aims at examining the situation of planning in the two countries through the various indicators identified and where the planning training is located in this frame. Some of the identified indicators can be grouped into the current situation of planning, dominant topics in planning, theory and practice review, identification and reduction of inequalities, future challenges, and the approach of planning education to these challenges. The aim is to examine approaches in existing planning education in the two countries and to make recommendations in the light of the results of these examinations.

URBAN PLANNING BY LE CORBUSIER ACCORDING TO PRAXEOLOGICAL KNOWLEDGE

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ABSTRACT

The city is formed as a mosaic of various elements which affect its attractiveness. These elements range from location attributes, through economic opportunities, to social aspects. Therefore, urbanity and urban planning should be considered in a multi-dimensional context. In the paper we address the problem of urban planning by Le Corbusier according to praxeological and system knowledge. From praxeological point of view an active human being takes his/her choice between various possibilities by preferring one of these possibilities to the others, and by manifesting it by his/her actions. The same applies to the design process. Due to this fact, the scientific design process can be treated as a systematic rational reconstruction of the designer's behaviour. Such a reconstruction requires previous reflection on designer's work, as well as some consideration and design experience, thus know-how knowledge based on methodological knowledge. In the paper several city visions of Le Corbusier, as well as the characteristics and organisation of his design process are analysed. Le Corbusier's innovative design ideas resulted from industrialisation changes and motorisation accelerating progress, which gave foundation for a new urban array. This array based on strict geometric forms, regularity and repetition determining standard. Thanks to his theories, Le Corbusier established principles of modern city construction and planning. Although some doubts were expressed as to the scale of centralisation of the cities designed by him and his class-based conception, he was awarded that overall welfare of the individual living in a city was the quality of built environment. Therefore, his designed creations were not only functional but they also produced emotions. The analysis of his prolific design activities allows us to state that the organisation of his architectural and urban planning process was very efficient and complex. The city concepts proposed by him were the subject of analysis by generations of designers. Also now, they can still be the basis for modelling virtual and navigable cities by modern planners. Le Corbusier's comprehensive approach to modern city planning showed that research activities, that is theoretical thinking, and production activities, that is practice, are linked methodically. Therefore, urban planning should be understood not only as a projection of the possibilities of architecture, but as a multidisciplinary process. Due to this fact, a urban plan, as a result of that process, should be the synthesis of different social, industrial and economic aspects.

THE SUPPLY OF AND DEMAND FOR CULTURAL ECOSYSTEM SERVICES PROVIDED BY URBAN GREEN SPACES OF THE DENSELY BUILT-UP AREAS. POZNAN (POLAND) CASE STUDY

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ABSTRACT

The quality of life of large city dwellers depends on the use of green infrastructure. The idea of a compact city, opposed to urban sprawl, can lead to reduced access to green areas and to increased demand for cultural services provided through urban green infrastructure. The inability to meet the needs of the city inhabitants, resulting from the scarcity of green areas may adversely affect their well-being. Considering the above, the purpose of the paper was to identify the supply of and demand for cultural ecosystem services related to the urban green spaces in densely built-up urban areas. To find out how important the ability to use green areas for dwellers of the densely built-up areas in the city is, the questionnaire interviews with the residents of the area of the Old Town were conducted in September 2016. Assuming that the inhabitants of the Old Town can also enjoy the greenery in the immediate vicinity (15 min walk), the area covered by the survey has been extended to an 800 m buffer zone around the Old Town. Questions in the survey concerned: (i) the amount of green spaces and their availability (ii) the use of the green spaces and types of activity being undertaken for the different types of green areas, (iii) satisfaction of the existing green areas (iv) factors limiting the use of urban greenery and factors encouraging to visit green spaces more frequently (v) motives for using green areas away from inhabitants' place of residence. Based on the results, more than half of the respondents claimed that the number of green areas was satisfactory. The types of green spaces most frequently mentioned by respondents (urban parks, greenery associated with residential development, green areas along the streets) are considered to be available. The most popular way to use urban parks and greenery connected with housing development is just spending time outdoors (contact with nature), walking and nature observation. Walking and cycling/skating are the dominant types of activities related to green areas along the streets. In parks and greenery associated with residential development, the equipment found satisfying by inhabitants is: benches and areas for rest, walking paths, cycling routes, cafes and eating places. Equipment that residents do not satisfy is educational boards, outdoor gyms, places for games and playgrounds. The most significant limitations affecting the use of green areas in the opinion of the inhabitants are: the lack of free time, insufficient infrastructure for recreation and leisure, the lack of organized events. In response to these constraints, residents identified the factors that would encourage them to use particular types of greenery more often. Among others, it was the improvement of leisure and recreation infrastructure, better maintenance of the green areas, higher security level, more cultural events. Almost all residents use green spaces outside the study area, and more than half of them do it several times a month. The main reasons to visit other green areas are meetings with friends or family, larger space and better infrastructure for recreation and leisure. The general conclusion of the study is that green spaces of respondents' residence area and in its immediate vicinity are sufficient but require improvement of quality and should be better equipped with different amenities to increase the range of activities in the urban green spaces.

LANDSCAPE VALUES OF HISTORICAL POST-MILITARY OBJECTS IN URBAN PLANNING OF CHOSEN POLISH CITIES

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ABSTRACT

Location of military objects was based on functional - technological (fortess's location was result of area's topography and weapon technology, enclosure structure of fortifications and barracks was based on fuctional system of army and actual war techniques) and political (symbolic of power over the given area) consideretion in history. The purpose of the work is indicating spatial features of historic postmilitary complexes and their contemporary landscape values in choosen Polish cities. They are an effect of historical locations and spatial forms of complexess. They are elemnt of local history and identity. We should protect them in process of contemporary revitalisation of former military objects. Reserches were carrying out on two fundamental forms of objects from the turn of 19th and 20th centuries located especially in the area of nort-eastern Poland: 1) fortress systems and 2) barracks ansambles. Spatial features of both forms of fortified complexes were established. Defined features should be included in urban planning and spatial development of cities to protect historical values. Special attention was paid to the passive and active exposition of historical objects in contemporary landscape. There were presented examples of revitalised postmilitary complexess in choosen Polish cities (fortres: Warszawa, Zegrze, Modlin, Poznan, Kraków, ...and numerous barracks complexes).

FROM URBAN TO RURAL: CHALLENGES FOR OVERSIZING URBAN PERIMETERS

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ABSTRACT

This article, based on the literature review, aims to study the challenges of the urban dispersion and oversizing of urban perimeters. It is focused on the case study of Portugal. The patterns of occupation of its territory have changed significantly over the last century, moving from a rural society to a cosmopolitan realm. This deep changing has occurred not only in urbanistic terms but also in the economic, cultural and social organization of the country, under a movement that corresponds to a decline of urban settlements in rural areas, especially in the Interior regions (near to the border with Spain). These transformations were not driven by any significant public policy for land-use actions. On the contrary, the production of urban areas, supporting the new model of economic and social development was largely left to the initiative of economic and social private agents and land owners. As a main result of this research, there is the huge expansion of the urban perimeters, which has led by local authorities (municipalities), promoting spatial planning instruments, such as the Master Plan, advocating the swap of the land-use from rural to urban. Often, the rural areas have a great potential to be classified for agriculture purposes, with no urbanization or building permissions. Consequently, there are in Portugal approximately 700.000 empty flats (according to the national statistics from 2011) and many areas considered part of the urban perimeters that in fact remain with rural activities. Therefore, many of the planned areas for housing, tertiary activities or industry are expectant (empty) or abandoned. This situation is mainly due to the oversized urban perimeters. However, this problem become more serious considering the most recent statistics that are showing a stagnation of the population growth or even a decrease in several regions with a lower development in economic terms. In this sense, the main conclusion revealed by the literature, is that one of the pivotal challenges of spatial planning regarding contemporary cities is combining the old city center, historical, dense, very well qualified, and with a great diversity of activities, with a fragmented peripheral urban space, for housing, with a lack of density in terms of buildings, in order to afford its high level of infrastructures, unplanned as a whole, depending on the use of the car. Could the non-urbanized urban areas, included in the urban perimeters by the Master Plans turn back to the rural land-use, losing their market value? This is one of the challenges ahead of the spatial planning instruments.

ADVANTAGES OF A SPATIAL PLANNING SYSTEM FOCUSED ON THE LOCAL LEVEL

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ABSTRACT

Traditionally the spatial planning system is likely to be organized in a framework with several levels of actions, authorities, entities and instruments. These levels are related with the correspondent layers of the public administration. As the literature is advocating for a long time ago, there are two methods in the way how these levels are working in a complementary system and organizing the spatial planning framework: the top-down approach, which goes from the decisions of the higher political authorities (at the national level) to the lower level i.e. the local authorities, and the bottom-up process, which works on the opposite direction. In this sense, this article aims to present a set of advantages related on the bottom-up approach of the spatial planning system. It has as an example the case of the Portuguese system, which is organized in four levels of action in terms of spatial planning domain, which are the following: National level, reginal level, inter-municipal level and local level. This case shows that there are several advantages for the urban territories; cities, villages or towns; in having a strong role by the local authorities at the spatial planning responsibilities. One of the advantages is the deep knowledge that local entities have of the urban territories. Therefore, local authorities are in a better position to plan the urban spaces. This planning action is achieved through the detail local plans, focused on urban design solutions. The main conclusion is that throughout the detailed local plans, on the behalf of local authorities is more successful the spatial planning action related on the qualification of urban areas.

POSTINDUSTRIAL OBJECTS AND BUILDINGS IN THE STRUCTURE OF THE CONTEMPORARY CITY

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ABSTRACT

In the II half of the 19th century provincial so far Bialystok became an industrial major city on eastern areas of the Republic of Poland.The economic conditioning, resulting from the development of the railway and changing customs policy of the Russian Empire, became a cause of his development networks.Within a dozen or so years in the city several dozen textile factories and numerous craftsman's workshops were made.The development of the industrial city was stopped by the First and again the Second World War.The II half of the 20th century also brought political and economic changes.They resulted from nationalizing the industry and introducing the socialist economy. In next decades in the city a heavy and light industry developed. Metallurgical plants and factories: of houses, furniture, carpets, packages, electronic, glassworks, of food processing were made. On the outskirts of town industrial districts which apart from factories stock objects gathered came into existence. Economic changes which took place in Poland after 1989 caused the consecutive change in the area of the Bialystok industry. Many of national factories went bankrupt and remaining after them objects and areas had to change their purpose. In conducted examinations methods of proceedings were compared from unnecessary at present with structure. In addition for it's location value was considered in the structure of the city and cultural with reference to objects. Analyses allowed to point a new way of using postindustrial objects. Postindustrial buildings were appointed which at present serve cells: residential, office, educational, commercial, cultural. The authors also pointed so which didn't find one's new purpose and were knocked down or at present aren't being used. To sum up conducted examinations were stated, that postindustrial legacy of the city to the same degree constitutes it's legacy - places building the identity as well as difficult urban planning issue from the scope of the revitalization of big urban areas. In addition implementations judged positively and negatively were shown. The analysis allowed for formulating overall conclusions.

REVITALISATION AS A METHOD OF PLANNING SUSTAINABLE DEVELOPMENT OF OLD TOWN COMPLEXES IN HISTORIC TOWNS

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ABSTRACT

Old towns in spatial structures of historic towns are the areas which - same as centuries before - serve as the town centres. In small towns especially, this is almost invariably true, as the inner town district is more frequently the site where a town was originally located and is often the manifestation of its historic identity. However, functional and spatial problems of many small historic towns arise from the above trend, mostly because of the frequently high density of buildings in the oldest part of a town. The intricate nature of elements creating the structure of a town's historic centre often calls for certain steps to be taken, which will ensure better exposure of an old town complex against the backdrop of the town's other areas. Numerous problems need to be solved, not only spatial but also economic and social ones. A town is a living organism, inhabited by people. The key to tackling these issues successfully lies in the creation of such revitalisation programmes that will improve the quality of space and help achieve the sustainable development of inner-town areas in historic towns. The historic centres in the medieval towns of Warmia, a region rich in history and situated in north-eastern Poland, can serve as an example and has been investigated in the following study. All the towns in Warmia located in the Middle Ages, except the capital of the region Olsztyn, can be classified as small urban developments. This group of eleven towns is dominated by the ones whose territorial coverage has not changed considerably since the location and the population ranges from a few thousand to less than twenty thousand. To this day, the historic quarters of these towns have remained the central ones in each town, and their urban structures to a various extent reveal the features characteristic for the period when they were created. The differences are due to the war damage the towns suffered at the end of World War Two and because of the different ways in which they were reconstructed afterwards. In consequence, some elements of the original town master plans have been lost. Revitalisation is an approach whose aim is to improve the quality of space and the ability of inner town areas to function. Revitalisation goes beyond the purely spatial factors, and involves broadly understood economic and social considerations. The conclusions drawn from this research pertain to benefits of using the revitalisation method in planning a sustainable development of urban structures. The development and implementation of revitalisation programmes is a very complex process that takes many years and requires an integrated and interdisciplinary team effort. This method allows us to preserve the identity of historic town areas while enabling them to play functions in the contemporary life of a town.

SPATIAL ANALYSIS OF URBAN MASTER PLANS OF TOWNS IN NORTH-EASTERN POLAND IN THE CONTEXT OF URBAN REVALORISATION

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ABSTRACT

The research subject raised in this study is the urban structure of small towns in Warmia, a region rich in history, situated in north-eastern Poland. This area, together with the neighbouring region of Mazury, is referred to as the Land of a Thousand Lakes. The historical events, such as the conquest of this territory by the Teutonic Order in 13th century, gave rise to the foundation of twelve towns in Warmia, which have survived until our time. Of these settlements, only one, which is Olsztyn, has grown to a larger size over the centuries and eventually became the capital of Warmia. The others are still small towns, with a population from a few to fewer than twenty thousand inhabitants. The policy and economic goals of the Teutonic Order underlay the spread of a uniform type of urban master plan in the entire region. The establishment of urban centres was dictated by military considerations - all towns had fortified castles and were 15-30 km distant from one another, which stemmed from the organisation of the Teutonic State. The location of new towns in Warmia coincided in time with the general urban planning principles governing urban development in the Middle Ages. The medieval towns, which grew on the foundations of ancient cultures, were developed on a regular grid of streets, delineating land lots for compact town houses and a central square serving as a market place. Within this structure, the town's most significant spatial dominants, such as a town hall, a church and a fortified castle, were situated. The castle often stood on the outskirts of a town, as it had to be connected to the town's fortifications. The location of medieval towns in Warmia proceeded according to a similar concept. All these towns are distinguished by characteristically medieval, regular urban layouts, which - while being similar - have certain intrinsic features. Differences can be seen in the design of main streets, the size and proportions of market squares, the ways in which land parcels were developed as well as the location of public buildings. However, the space occupied by the old town has remained dominant in all these urban developments. This, to a large extent, explains the synthetic character of the following research. Spatial analysis of urban patterns developed in the twelve towns of Warmia was the principal objective of this study. Another aim was to confirm the hypothesis that medieval urban structures in Warmia (their old town's area) are the manifestation of the historical identity of these towns and bear some influence on their contemporary development. The conclusions drawn from the investigation, its objectives and the method employed, focus on the connections between the original functions of old towns with the modern-day needs and aspirations to further the towns' development whilst preserving the historic heritage. Processes designed in line with the above recommendations should eliminate threats to the structure of developed areas and the whole town's image. Another objective should be to improve the composition-related and aesthetic values of the inner-town space.

THREE LARGE HOUSING PROJECTS IN POLAND: PLANNING THE CITY OF 21.ST CENTURY

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ABSTRACT

During last twenty years in Poland there were constructed many interesting housing estates. Standard of housing environment, standard of flats are growing, also urban solutions are developing. Some of these realizations show new directions and give a new quality of Polish housing in the 21.st century. The purpose of study is characteristics of the housing environment of the three largest housing projects from Poland of 21.st century. They create concept something like "city in the city" so that is why the author also asks about the problem of city planning and the relation of new housing space to the city space. The study is based on very important examples chosen by the author: Marina Mokotów Estate, Eko Park Estate and Wilanow Town. All they are located in the city of Warsaw, the capital of Poland. The analysis includes - for first urban composition of complexes, solutions of the wheeled and walking transport, systems of parking, secondly spatial concepts of surroundings - standards of semi-public space, recreational space. The author is also asking questions about the place of these estates - icons in the city structure, the relation to the public spaces and the access to the social services (schools, kindergardens, etc.). The analysis showed significant differences in the way of urban development of mentioned above housing estates and the different relationship to public spaces and the city space. They represent different typology in creating city planning of 21.st century. Marina Mokotow Estate - is a city in the city, in most is reversed from the surrounding buildings, is a product of alienated, creating an artificial world with artificial lake - gated community. Eco Park Estate has a legible urban plan, which is the consequence of imposed and adopted regulations. The quarters are partially open to the public spaces, and a general plan of the settlement assumed from the beginning of a very conscious shaping of public spaces with good integration with the city. There was provided the location of trade, services, on the ground floors of buildings and public facilities. Through the multi-functionality Eko-Park has become an example of heterotype in the urban structure. Wilanow Town, arranged by a consistent system of closed quarters, represents a step backwards in the composition of urban housing structure. The idea of creation clear city streets with buildings along appears to be generally correct, but the manner of its implementation - the 'dead' ground floors with no services, trade, and the lack of schools, kindergartens and other social infrastructure - seems inappropriate.

FACTOR AFFECTING THE SELECTION OF DIFFERENT CONSTRUCTION MATERIALS FOR BUILDING FACADES IN URBAN PLANNING OF LARGE CITIES

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ABSTRACT

The selection of construction materials for building facades is one of the important and challenging tasks in civil engineering and architecture engineering. Development of cities usually needs a specific attention to the design of new buildings in terms of the selection of different types of materials for building facades. Such an attention should be taken into account from economical, civil engineering and architecture engineering aspects. The main objective of this paper is to address the major factors affecting the selection of different construction materials for building facades in urban planning of large cities. To achieve the above mentioned objective, several building facades are photographed and analyzed in the north section of Tehran from different economical, civil engineering and architectural engineering aspects. The results show that from economical aspect, the selection of specific design for building facades should have enough justification with the total cost of construction of building. Therefore, it causes some limitations for designers and architectures. Furthermore, from civil engineering and environmental point of view the selected material should be compatible to the weathering conditions. Finally, the nominated building facades should be well-matched with the general urban planning of the area. Based on the fundamental discussions it is concluded that focusing on a single aspect may come to a wrong decision from practical and general engineering point of view. In other words, it is concluded that the urban planning is a multidisciplinary task. A comprehensive attention to this subject guaranties the sustainable urban planning design in terms of confident development. In such a case, the architecture will be able to select the most appropriate building facades for different parts of large cities in the development process of each area.

THE URBAN LANGUAGE (URBSLINGUA)

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ABSTRACT

The city constitutes a focus of attention for numerous scientific disciplines: urban planning and architecture, geography, history, sociology, cultural studies, economy, etc. As those disciplines develop to become more specialised and internally diversified, and as narrower and specialised study areas merge to form interdisciplinary fields, the city becomes their object of study as well (in urban sociology; history of city building; urban planning; urban geography; urban economy; etc). Depending on the approach favoured by an individual researcher, studies aimed at developing theoretical constructs or working out practical solutions can be problem-oriented (holistic) or centred on a single aspect (partial). The multiple complexity of the urban space, however, always requires an interdisciplinary approach, whereby individual aspects studied are viewed in a holistic context. Therefore, a research field termed the urban studies has become a common denominator of those who study the city. This text proposes a concept of an urban language, urbslingua, embedded in the urban studies and discussed in the author's book Miasto - przestrzen semantyczna ('The City: a Semantic Space'). It is a tool with which to identify spatial phenomena in need of research, and with which to place the fragment of space under study in the holistic picture of the city. The urban language structure has been modelled on those insights of linguistics in which the language, as well as being a communication tool, is also a means for thought and culture perceived as communication. The city has been treated as a spatial message, the urban space being a multilayered spatial text. The text is written with morphosigns. A morphosign, which is a language equivalent of a grapheme, is an indivisible structural element of the urbanized space. Morphosigns, emergent from the urban form (defined by International Seminar on Urban Form, ISUF), denote designates of all types of human activities the spatial reflections of which are situated within the confines of the urban space; the urban space is their synthesis and binder. Morphosigns are bound together by culture, which is a navigator of urban spatial order, i.e., it is a syntax. Culture, and pre-culture from which culture has descended, is understood in terms of Edward Hall's communication theory of culture as a silent language. An individual, while functioning within a defined territory, transforms his/her biological activities (i.e., pre-culture) into culture by shaping those activities in the way he/she thinks fit and in agreement with local environmental conditions. In the urban language, the universal human biological needs (pre-culture) correspond to linguistic phonemes. They are systematised into Primary Message Systems (PMS), with the culture map as their matrix. The PMS's or types of human activities, pervading one another, form the substance of culture and have their spatial designates. The latter are fixed (written) in the urban space via different combinations of morphosigns. The text consists of six sections and a number of sub-sections. The sections are as follows: (1) The city, culture and its map; (2) The concept of the urban language; (3) Morphosigns: structural units of the urban space; (4) Urban message: a conventionalized record of human activity; (5) The composite scanning method; (6) The metaphor as interpretation.

INDOOR RADON CONCENTRATION RELATED TO DIFFERENT RADON AREAS AND INDOOR RADON PREDICTION

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ABSTRACT

Indoor radon has been observed in the buildings at areas with different radon risk potential. Preventive measures are based on control of main potential radon sources (soil gas, building material and supplied water) to avoid building of new houses above recommended indoor radon level 200 Bq/m3. Radon risk (index) estimation of individual building site bedrock in case of new house siting and building protection according technical building code are obligatory. Remedial actions in buildings built at high radon risk areas were carried out principally by unforced ventilation and anti-radon insulation. Significant differences were found in the level of radon concentration between rooms where radon reduction techniques were designed and those where it was not designed. The mathematical model based on radon exhalation from soil has been developed to describe the physical processes determining indoor radon concentration. The model is focused on combined radon diffusion through the slab and advection through the gap from sub-slab soil. In this model, radon emanated from building materials is considered not having a significant contribution to indoor radon concentration. Dimensional analysis and Gauss-Newton nonlinear least squares parametric regression were used to simplify the problem, identify essential input variables and find parameter values. The presented verification case study is introduced for real buildings with respect to various underground construction types. Presented paper gives picture of possible mathematical approach to indoor radon concentration prediction.

INDOOR AIR QUALITY AND THERMAL COMFORT IN SCHOOL BUILDINGS

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ABSTRACT

This paper presents results to thermal comfort and environment quality questions in 21 school building rooms. Results show that about 80% of the occupants expressed satisfaction with their thermal comfort in only 11% of the buildings surveyed. Air quality scores were somewhat higher, with 26% of buildings having 80% or occupant satisfaction. With respect to thermal comfort and air quality performance goals set out by standards, most buildings appear to be falling far short. Occupant surveys offer a means to systematically measure this performance, and also to provide diagnostic information for building designers and operators. The odors from building materials as well as human odors were studied by field measurement. The odor intensity and indoor air acceptability were assessed by a sensory panel. The concentrations of total volatile organic compounds and carbon dioxide were measured. The odors from occupancy and building materials were studied under different air change rate. The case study of indoor air acceptability concerning to indoor odors and its effect on perceived air quality are also presented in this paper.

ADDITIONAL EQUIPMENT FOR SOIL BIODEGRADATION

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ABSTRACT

Intensification of industrial production, increasing citizens' living standards, expanding the consumer assortment mean in the production - consumption cycle a constantly increasing occurrence of waste material, which by its very nature must be considered as a source of useful raw materials in all branches of human activity. In addition to strickt legislative requirements, a number of circumstances characterize waste management. It is mainly extensive transport associated with the handling and storage of large volumes of substances with a large assortment of materials (substances of all possible physical and chemical properties) and high demands on reliability and time coordination of follow-up processes. Considerable differences in transport distances, a large number of sources, processors and customers, and not least seasonal fluctuations in waste and strong price pressures can not be overlooked. This highlights the importance of logistics in waste management. Soils that are contaminated with oil and petroleum products are hazardous industrial waste. Methods of industrial waste disposal are landfilling, biological processes, thermal processes and physical and chemical methods. The paper focuses on the possibilities of degradation of oil pollution, in particular biodegradation by bacteria, which is relatively low-cost among technologies. It is necessary to win the fight with time so that no ground water is contaminated. We have developed two additional devices to help reduce oil accident of smaller ranges. In the case of such an oil accident, it is necessary to carry out the permeability test of contaminated soil in time and, on this basis, to choose the technology appropriate to the accident - either in-sit biodegradation - at the site of the accident, or on-sit - to remove the soil and biodegrade it on the designated deposits. A special injection drill was developed for in-sit biodegradation, tossing and aeration equipment of the extracted soil was developed for on-sit biodegradation.

MECHANIZATION FOR OPTIMAL LANDSCAPE RECLAMATION

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ABSTRACT

Reclamation is a method of ultimate utilization of land adversely affected by mining or other industrial activity. The paper explains the types of reclamation and the term “optimal reclamation”. Technological options of the long-lasting process of mine dumps reclamation starting with the removal of overlying rocks, transport and backfilling up to the follow-up remodelling of the mine dumps terrain. Technological units and equipment for stripping flow division. Stripping flow solution with respect to optimal reclamation. We recommend that the application of logistic chains and mining simulation with follow-up reclamation to open-pit mines be used for the implementation of optimal reclamation. In addition to a database of local heterogeneities of the stripped soil and reclaimed land, the flow of earths should be resolved in a manner allowing the most suitable soil substrate to be created for the restoration of agricultural and forest land on mine dumps. The methodology under development for the solution of a number of problems, including the geological survey of overlying rocks, extraction of stripping, their transport and backfilling in specified locations with the follow-up deployment of goal-directed reclamation, will make it possible to reduce the financial resources needed for the complex process chain by utilizing GIS, GPS and DGPS technologies, logistic tools and synergistic effects. When selecting machines for transport, moving and spreading of earths, various points of view and aspects must be taken into account. Among such aspects are e.g. the kind of earth to be operated by the respective construction machine, the kind of work activities to be performed, the machine's capacity, the option to control the machine's implement and also economic aspects and clients' requirements. All these points of view must be considered in the decision-making process so that the selected machine is capable of executing the required activity and that the use of an unsuitable machine is eliminated as it would result in a delay and increase in the project costs. Therefore, reclamation always includes extensive earth-moving work activities restoring the required relief of the land being reclaimed. Using the earth-moving machine capacity, the kind of soil in mine dumps, the kind of the work activity performed and the machine design, a SW application has been developed that allows the most suitable machine for the respective work technology to be selected with a view to preparing the land intended for reclamation.

THE SUNPHOTOMETER AIRBORNE VALIDATION EXPERIMENT IN DUST (SAVEX-D): VALIDATION OF AERONET AND SKYNET SIZE DISTRIBUTIONS

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ABSTRACT

The Sunphotometer Airborne Validation Experiment (SAVEX-D) experiment took place in August 2015 in the Cape Verde archipelago, clustering with the ICE-D (Ice in Clouds Experiment - Dust) campaign led by the Met Office and the Universities of Leeds and Manchester. AERONET and ESR/SKYNET sunphotometers were deployed in Cape Verde for the duration of the campaign. The main objective of SAVEX-D was the validation of AERONET and ESR/SKYNET ground based sunphotometer retrievals of columnar aerosol properties such as volume size-distribution, single scattering albedo, refractive index and phase function, to be achieved with direct comparison with aircraft in-situ measurements (including size-distributions). Previous comparative studies between the AERONET and ESR/SKYNET networks have shown that important discrepancies in retrieved aerosol properties can arise, that are very important for climatological studies, aerosol model verification and satellite retrieval validations. Two flights on 16th and 25th August 2015 were performed. The average aerosol optical depth during the experiments time was 0.4 - 0.6 in mostly cloud free skies, guaranteeing good conditions for aerosol inversions. As a result, AERONET level 2 retrievals (based on CIMEL CE318 data) are available for Praia and Cape Verde sites during the experiments flight time. Similarly, ESR/SKYNET retrievals (based on PREDE POM01 data) performed with different algorithm versions, were possible. For the validation of the sunphotometer retrievals, airborne in situ size distributions were measured at several straight runs over the sunphotometer area with three different instruments (PCASP, CDP, 2DS). The average distributions were vertically integrated using the airborne LIDAR and nephelometer profiles. Results show that ground based AERONET and SKYNET are fairly consistent in the interval 0.2 - 2.0 ?m in comparison to the reference in situ distribution, although the differences increase in the extremes of the distributions. For coarse particles, the AERONET distributions underestimate the reference insitu distributions.

EUFAR funded the airborne segment of SAVEX-D. Airborne data was obtained using the BAe-146 Atmospheric Research Aircraft flown by Directflight Ltd. and managed by the Facility for Airborne Atmospheric Measurements (FAAM), which a joint entity of the Natural Environment Research Council (NERC) and the Met Office. R. Cotton, T. Choularton, M. Gallagher, K. Bower, J. Taylor, J. Crosier, G. Lloyd, D. Lui, P. Rosenberg, J. McQuaid, B. Murray, H. Price, FAAM, and the full team taking part in the ICE-D campaign are gratefully acknowledged for their assistance and the provision of datasets The filter sample analysis was funded by UK Independent Research Fellowship NERC grant NE/M018288/1. The Spanish Ministry of Economy and Competitiveness and the Valencia Autonomous Government support the data analysis through projects CGL2015-64785-R, CGL2015-70432-R, and PROMETEUII/2014/058. We also thank AERONET and ESR/SKYNET staff for providing support

ASSESSMENT OF THE AEROSOL OPTICAL DEPTH FROM ESR/SKYNET, AERONET AND PFR/GAW NETWORKS

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ABSTRACT

The aerosol optical depth is the most simple and comprehensive parameter to monitor the aerosol burden in the atmosphere, and it can be measured with relatively simple instruments called sunphotometers. Sunphotometers have become popular last decades due to the increasing interest on the effect of the atmospheric aerosols and clouds on the Earth climate and on the need to validate remote sensing products. Global sunphotometer use has been boosted by the appearance of several international networks that rely on available commercial systems. These international networks adhere the recommendation of the WMO, with well-tracked calibration routines and homogeneity of the elaboration algorithms, allowing users to obtain frequent and accurate estimations of the AOD. In this study, we have performed a comparison of the AOD retrieved from three different instruments (Prede POM01, Cimel CE318 and PFR) that are the respective standards from the ESR/SKYNET, AERONET and GAW/WMO international networks. The comparison took place at Burjassot site (Valencia, Spain) in the period February - April 2015 where the three instruments have been co-located. The wavelengths in common among the three instruments are 500 and 870 nm, although the comparison has been extended at other wavelengths (440, 675 and 1020 nm) by using the Ångström exponent (AE) determined with the available instrument wavelengths. The measurement site is close to sea level (60 m a.s.l.), near the Mediterranean coast (10 km) and within the metropolitan area of Valencia City (over 1.500.000 inhabitants) in the East coast of Spain. Due to its geographical location, maritime and continental aerosols are present. However, urban aerosols are dominant at the site, even though the annual average AOD is relatively low (0.19 at 440 nm), reaching values as low as 0.04, mainly in winter season. The general conditions were generally good for the comparison, with low turbidity and cloudless skies. AOD showed a good agreement between CIMEL and PREDE at both main channels. The comparison between PREDE and CIMEL, for both 500 and 870 nm, showed a RMS of 0.005 and a bias of 0.003, below the nominal uncertainty of 0.01-0.02 for both instruments. The comparison between PREDE and PFR for 870 nm showed a RMS of 0.006 and a bias of 0.005, whereas the results at 500 nm were 0.007 and 0.006, respectively. The comparison between CIMEL and PREDE was within the WMO limits by better than 98% for both channels. The agreement between PFR and CIMEL was 81% and 97% within the WMO limits for 500 nm and 870 nm respectively.

The Spanish Ministry of Economy and Competitiveness and the Valencia Autonomous Government support the data analysis through projects CGL2015-64785-R, CGL2015-70432-R, and PROMETEUII/2014/058.

BROADBAND SOLAR RADIATION AND CLOUD EFFECT MEASURED IN TWO URBAN AND RURAL BACKGROUND SITES IN EASTERN SPAIN

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ABSTRACT

Solar radiation arriving at the Earth's surface (spectral interval 0.2 - 4 ?m) has a large temporal variability due to the different scattering and absorption processes produced by the atmospheric components (gases, aerosols and clouds) when the radiation gets through the atmospheric path. Due to the scattering, the solar radiation reaches the surface as direct radiation (the unaltered solar beam) and diffuse radiation (scattered fraction reaching the ground from different directions after the interaction with gas molecules, solid particles and cloud droplets). The sum of both components is called total or global radiation, and it is generally described in terms of irradiance (flux density, W/m2) or irradiation, if it is integrated with time (kJ/m2). The incoming solar radiation is the main energy source in the terrestrial system, therefore it has a large importance in different fields related with the environment (meteorology, climatology) but also in other applied disciplines such as human health, renewable energy or tourism. The Solar Radiation Group from the University of Valencia started measuring the broadband solar radiation in the 90's at the Burjassot station (located in the suburbs of the Valencia city in eastern Spain, 39.51N 0.42W 60 m a.s.l.). In 2010 the Burjassot station was updated with a solar tracker and new CMP21 and CHP1 radiometers with forced ventilation for measuring the direct, diffuse and global components of the broadband shortwave radiation. Currently, other instruments for measuring solar radiation and aerosols at the surface and in the atmospheric column are available in the station. In year 2012 a new station was created in Aras de los Olmos astronomical observatory (39.95N 1.10W 1300 m a.s.l.), 100km NW far from the urban Burjassot station. This background station has been equipped with similar instruments for the observation of solar radiation and in situ and columnar aerosols. In this study we show results of the solar irradiance components (direct, diffuse, global) in the Burjassot and Aras de los Olmos stations for the last three years, including a statistical analysis of the measurements to know the multitemporal behaviour. The cloud effect on the solar radiation levels at ground has been also estimated for the three components and the two sites, by using the Long and Ackerman (2000) method, based solely on experimental levels. The quality of the data has been assured by applying the BSRN filters described in Roesh et al. (2011) with some additional conditions.

The Spanish Ministry of Economy and Competitiveness and the Valencia Autonomous Government support the data analysis through projects GL2015-64785-R, CGL2015-70432-R, and PROMETEUII/2014/058.

TEMPERATURE AND RELATIVE HUMIDITY VERTICAL PROFILES WITHIN PLANETARY BOUNDARY LAYER IN WINTER URBAN AIRSHED

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ABSTRACT

The planetary boundary layer is a dynamic system with turbulent flow where horizontal and vertical air mixing depends mainly on the weather conditions and geomorphology. Normally, air temperature from the Earth surface decreases with height but inversion situation may occur, mainly during winter-time. Pollutant dispersion is poor during inversions so air pollutant concentration can quickly rise, especially in urban closed valleys. Air pollution was evaluated by WHO as a human carcinogen (mostly by polycyclic aromatic hydrocarbons) and health effects are obvious. Knowledge about inversion layer height is important for estimation of the pollution impact and it can give us also information about the air pollution sources. Temperature and relative humidity vertical profiles complement ground measurements. Ground measurements were conducted to characterize comprehensively urban airshed in Svermov, residential district of the city of Kladno, about 30 km NW of Prague, from the 2nd Feb. to the 3rd of March 2016. The Svermov is an air pollution hot-spot for long time benzo[a]pyrene B[a]P limit exceedances, reaching the highest B[a]P annual concentration in Bohemia - west part of the Czech Republic. Since the Svermov sits in a shallow valley, frequent vertical temperature inversion in winter and low emission heights of pollution sources prevent pollutant dispersal off the valley. Such orography is common to numerous small settlements in the Czech republic. Ground measurements at the sports field in the Svermov were complemented by temperature and humidity vertical profiles acquired by a Vaisala radiosonde positioned at tethered He-filled balloon. Total number of 53 series of vertical profiles up to the height of 300 m was conducted. Meteorology parameters were acquired with 4 Hz frequency. The measurements confirmed frequent early-morning and night formation of temperature inversion within boundary layer up to the height of 50m. This rather shallow inversion had significant influence on air quality due to inversion cap over the valley. Nevertheless, formation of an inversion showed strong diurnal variability. For example, on the 18th Feb. early morning shallow inversion quickly disappeared within less than 2 hours. According to this study tethered balloon measurements has proved to be a good tool for completion comprehensive ground air quality measurements.

This work was supported by the project CENATOX under grant GACR P503/12/G147.

TRENDS IN EXTREME PRECIPITATIONS IN POLAND, 1961-2010

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ABSTRACT

Characteristics of extreme precipitations from the period 1961-2010 together with their trends for eight stations located in different parts of Poland are analyzed. Fife indices enabling the assessment of intensity and frequency of both extremely dry and wet conditions were applied. The indices include: number of days with precipitation >10mm/day (R10), maximum number of consecutive dry days (CDD), maximum 5 days precipitation totals (R5d), simple daily intensity index (SDII) and fraction of annual total precipitation due to events exceeding the 1961-1990 95th percentile. Annual trends were calculated using standard linear regression method and its statistical significance at the 95% confidence level was assessed with the help of F Snedecor probability distribution. Changes in extreme precipitations show mixed patterns. A significant positive trend for number of days with precipitation >10mm/day (R10) appears in central Poland and significant negative one is present in south-eastern Poland. The analysis of maximum 5 days precipitation totals (R5d) detected statistically significant positive trends in north-western and western as well as in eastern part of the country and negative trends in central and north-western part of investigated area. Daily precipitation, expressed by single daily intensity index (SDII) increases in north and central Poland whilst in southern Poland the tendencies are negative and statistically insignificant. Finally, fraction of annual total precipitation due to events exceeding the 1961-1990 95th percentile rise only at the station in Warsaw. The only indicator, that refers to dry conditions, maximum number of consecutive dry days (CDD) shows negative trends almost throughout the surveyed area, except for Szczecin station, representing north-western part of Poland.

POLLEN CHARACTERIZATION IN SIZE SEGREGATED ATMOSPHERIC AEROSOL

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ABSTRACT

Pollen, an important part of bioaerosol, is indispensable part of atmospheric aerosol, omnipresent colloid dispersed in the Earth atmosphere. Recently, the impact of bioaerosol particles on atmospheric processes has been studied with increasing intensity. Therefore, pollen analysis became indispensible part of comprehensive aerosol characterization studies at nowadays. The first stage of a High Volumetric Cascade Impactor - HiVol (BGI-900), used for sampling of aerosol particles larger than 10 micrometers in aerodynamic diameter, was tested for bioaerosol sampling. Low air flow-rate and low pressure-drop at the jets of the first stage and high air volume are advantageous parameters which would favor the use of the first stage for bioaerosol sampling. The sampling went in urban, rural and background localities, Prague, Brezno and Laz respectively, in the Czech republic in summer and autumn. Method of pollen separation from the impaction substrate, polyurethane foam, into homogeneous deposit on Nylon filter was optimized. Representative portion of the deposit was analyzed by a scanning electron microscopy - SEM. There were taken 485 SEM images from 12 samples in 3 localities in the Czech Republic. Pollen grains were identified in 295 SEM images and determined into 9 genus and 4 families. The grain deformities were quantified to be 24, 18, 50% for Prague, Brezno and Láz localities. The polled grains of the Poaceae family were found with the highest frequency. Number of pollen increased with total aerosol mass in Prague locality only. There were also identified rather unique insect secretion products brochosomes in the samples.

Study was supported by the project CENATOX under grant GACR P503/12/G147.

AN OBSERVATIONAL STUDY OF SPATIAL VARIABILITY OF NOCTURNAL TEMPERATURE DUE TO ACCUMULATION AND POOLING OF DRAINAGE FLOW

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ABSTRACT

The accumulation of cold air in a valley or basin resulting from nocturnal cooling is one of the most marked phenomena regarded as local topographic climate. An understanding of terrain related processes such as drainage, which govern the cold pool structure at fine resolution, is required in order to develop and improve post-processing method to model air temperature cooling. However, the study of cold air drainage over hilly topography at fine resolution is problematic due to the influence of orography and lack of consequently spatiotemporal climate data. The main objective of this research was to spatial characterised the cold air accumulation and the corresponding temperature variations at a fine scale. Toward this aim, a series of field campaigns were carried out in a hilly agricultural area where the local topography consisted of rapid vertical variations located in Québec, Canada. Air temperatures at a height of 1 m were observed every 30 minutes, with a resolution of 50 m making use of 53 data loggers. We hypnotized that the high-resolution network provides a better spatial information and a clearer picture of the minimum temperature patterns and gives more information about cooling processes. Nocturnal air temperature variations were analysed during calm wind and clear sky conditions. The key question addressed by this study was: what is the spatial difference in nocturnal air temperature cooling rateabstract in this file and upload it into the registration web field. Results show heterogeneous air temperature cooling in the study area. Variations in minimum air temperatures ranged between 0.5°C and 2°C on the study site , decreasing by 2°C on the lower area. The results indicated steep temperature gradients along the slopes along short distances. The cooling rate was higher in the basin area. Observations show a decrease in cooling rate from 0.9 (C h-1) to 1.5° (C h-1) between two points with 150-meter distances (One point was selected on the slope while the other point was located 150 m away in the basin). Since soil properties, land cover, and field architecture were uniform, we believed that the local topography was the most important factor, which influenced on the minimum temperature variations and possibly microclimate changes. The results demonstrated that minimum temperature variations were regulated by probability of cold air accumulation and cold pools, both key factors in the establishment of nocturnal temperature patterns. Finally, the importance of fine resolution observations to monitor local cold pools, as well as their impact on minimum temperature patterns in areas prone to frost was demonstrated.

FILLING GAPS IN TIME SERIES OF SPACE-GEODETIC POSITIONING

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ABSTRACT

Several methods of time series analysis and forecasting require data at regular time intervals. But in space geodesy, most data sets are often full of gaps, resulting for example from hardware issue, modification of models, change of analysis strategy, local geophysical phenomenon, etc. The purpose of this paper is to fill the gaps in time series of space geodetic station coordinates, by the use of two different approaches: the iterative singular spectrum analysis (ISSA) and the generalized regression neural networks (GRNN). In order to test the performance of the proposed methods to properly process missing data, we created gaps at random points in regular time series (i.e. time series without gaps) of GPS (Global Positioning System) and DORIS (Doppler Orbitography and Radiopositioning Integrated by satellite) station coordinates with a data span longer than four years. For each analysed time series, we created gaps (by removing successive points) with a gap ration varying between 0.5% and up to 40%, and then we filled these gaps by ISSA, GRNN and other classical methods of interpolation such as nearest neighbour, linear and cubic interpolation. The interpolation precision was evaluated by the technique of cross-validation which compares the estimated values with the original data. After several simulations on coordinate time series with different lengths, we found that the ISSA technique provides better results in terms of root mean square error (RMSE). Indeed, the RMSE derived by ISSA, compared to those obtained by the other methods, were reduced up to 50%, especially for coordinate time series with large gaps and high standard deviation.

THREE DIMENSIONAL MODELING WITH TOPCON AND EXCAVATED VOLUME CALCULATION BY PREDICTING INITIAL TOPOGRAPHY IN A QUARRY

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ABSTRACT

Mineral resources are natural resources that can be produced once. Due to its non-renewable properties, mineral resources should be produced with the greatest benefit. Rock quarrying procedure includes a wide range of planning and procedures. Evaluating topography and reserve calculation are vital procedures to identify and describe open pit quarries. For this purpose, integrated computer programs are being used in all mining procedures from beginning to end. In this study, excavated topography was modeled as 2-dimensional with TOPCON equipment. Because of missing pre-production topographical data, topographic model was created depending on land observations and uniform surface gradient modelling. TOPCON data and uniform surface was applied to Geovia Surpac package program and first and final topographic models created. Then, excavated volume is calculated by intersecting these two topographies. This study presents three-dimensional modelling and volume calculation by using two-dimensional final topographic data only.

PERFORMANCE OF A CHEMICAL INJECTION IN A TYPICAL MIDDLE EASTERN RESERVOIR

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ABSTRACT

For many oil produces, the need to optimize oil production from current resources through Enhanced Oil Recovery (EOR) techniques is a main strategy to address their reservoir management challenges. In the Middle East, chemical EOR process is one of the very promising EOR methods that could be applied in many reservoirs. Chemical EOR is based on injecting one or more chemicals into the reservoirs that will displace more oil. Examples of these chemicals include polymers and surfactants. Therefore, the objective of this work was to develop and evaluate a simulation model of a candidate sandstone reservoir in order to define the new management and production strategies under which chemical injection process will yield better recovery. In order to develop the simulation model, an integrated full-field reservoir simulation study has been performed to determine the reservoir management and production strategies in a mature sandstone reservoir. Based on its characteristics, the reservoir was found to be most suited for a surfactant/polymer (SP) flood. The study started with a data gathering and the building of a full-field three-dimensional reservoir model. Subsequently, a full field simulation model was built and used to history match the water flood. The history match of the water flood established the initial condition of the reservoir for an SP flood, and generated a forecast of recovery performance for continued water flood operations. A sector model was constructed from the full field model and then used to study different design parameters to maximize the reservoir performance from the SP flood. The optimization process resulted in the selection of surfactant and polymer concentrations and slug size that yielded the optimum returns when applied in this reservoir. The paper will address the various investigated scenarios and production strategies and the performance of the SP flood when applied in this reservoir.

3D THERMAL MODEL OF THE NORTHERN PART OF THE MID-NORWEGIAN CONTINENTAL MARGIN

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ABSTRACT

A 3D subsurface thermal pattern of the Lofoten-Vesterålen segment and the adjacent part of the Vøring Basin within the Mid-Norwegian continental margin has been investigated to understand the thermal disturbance due to erosion and related deposition of glacial sediments during the Pleistocene. This work has been done in order to identify the major features of the conductive thermal field changes during the regional uplift and erosion within the mainland and the large part of the Lofoten-Vesterålen margin and subsequent rapid deposition of the eroded material within the south-western part of the Lofoten-Vesterålen margin and the adjacent Vøring Basin. A lithosphere-scale 3D structural model of the study area has been constructed to be a realistic approximation of the geometries of the sedimentary cover, underlying crystalline crust and lithospheric mantle during the 3D thermal modelling. All available published/released data have been considered and the initial model has been tested and finally refined using a 3D density modelling by use of IGMAS+ (the Interactive Gravity and Magnetic Application System). The final model covers the Vestfjorden, Ribban and Røst basins, the northern parts of the Vøring Basin and the Trøndelag Platform, extending from the Fennoscandian Shield to the north-eastern part of the North Atlantic Ocean. The 3D thermal modelling has been made by use of the commercial software package COMSOL Multiphysics. As an upper thermal boundary condition, time-dependent temperature at the Earth's surface and sea bottom, considering palaeoclimatic changes during the Cenozoic, has been used. The lithosphere-asthenosphere boundary has been set as a lower thermal boundary which corresponds to a 1300 °C isotherm. This lower boundary takes also into consideration the influence of early Cenozoic continental breakup. In addition, the effects of late Cenozoic erosion and sedimentation have been included during the 3D thermal calculations. The results of the thermal modelling indicate that the mainland is generally colder than the basin areas within the upper part of the 3D model. The thermal influence of the early Cenozoic continental breakup is clearly recognizable within the western and deep parts of the continental margin. The thermal effects of the simultaneous erosion and deposition within the study area indicate that a positive thermal anomaly exists within the areas where sedimentary and crystalline rocks were eroded, whereas the negative one occurs in the specific areas affected by subsidence and subsequent sedimentation. These two thermal anomalies are associated with the areas showing relatively high erosional and depositional rates.

The 3D conductive thermal modelling has been performed in the framework of the NEONOR2 project, "Neotectonics in Nordland - implications for petroleum exploration".

INTERPOLATION APPROACHES FOR CHARACTERIZING SPATIAL VARIABILITY OF SOIL PROPERTIES IN TUZ LAKE BASIN OF TURKEY

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ABSTRACT

Soil management is an essential concern in protecting soil properties and in enhancing appropriate quality for plant growth, agricultural productivity and for preventing soil erosion. Environmental scientists and managers require accurate and well-distributed spatially continuous data across a region for risk assessment and for effectively monitoring environmental issues. Recently, spatial interpolation approaches have been utilized in various disciplines including soil sciences for analysing, predicting and mapping distribution and surface modelling of environmental factors such as soil properties. The study area, Tuz Lake and its vicinity lands have significance ecological and economic importance. In this area, fertile soil plays an important role in agricultural activities which is one of the main industries that has impact on economic condition of the region. Loss of trees and bushes due to intense agricultural activities in some parts of the basin lead to soil erosion. Besides, soil salinization due to both human-induced activities and natural factors has exacerbated its condition regarding agricultural land development. This study aims to compare capability of Local Polynomial Interpolation (LPI) and Radial Basis Functions (RBF) as two interpolation methods for mapping spatial pattern of soil properties including soil organic matter, phosphorus, lime and boron in Tuz Lake Basin of Turkey. Both LPI and RBF methods demonstrated promising results for predicting soil lime, organic matter, phosphorous and boron. Relationship between known measured validation points and their corresponding estimated values in the same location is examined by conducting linear regression analysis, and as a result eight prediction maps for soil organic matter, phosphorus, lime and boron parameters are produced. The outcomes indicate that RBF performance in predicting lime, organic matter and boron put forth better results than LPI. However, LPI shows better results for predicting phosphorus.

DESIGN AND IMPLEMENTATION GEOSTATISTICAL FRAMEWORK (HUMGEOSTAT) FOR EVALUATING MINERAL RESOURCES: A CASE STUDY SIN QUYEN DEPOSIT (NORTHERN VIETNAM)

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ABSTRACT

This paper presents the results of the successful design and implementation geostatistical computing framework (HUMGeostat) which is designed based on the Stanford Geostatistical Modeling Software (SgeMS) platform. The SGeMS is an open-source computer package for solving problems involving spatially related variables. Recently, The HUMGeostat is playing very important role in Sin Quyen in order to support user to reduce uncertainty and improve the quality of mining exploration tasks. The Sin Quyen Cu-Fe-Au-REE deposit is one of the important mines for the North Vietnam mining industry. The framework has all the functions needed to solve a complete geostatistical problems including different variogram models (such as Spherical, Exponential, Gausian, Linear and Pure nugget effect); and four commonly used Kriging methods (Ordinary-Kriging, Simple-Kriging, Indicator-Kriging, CoKriging). The framework was applied to test various types of input data and particularly for complex copper ore bodies of Sin Quyen deposit. The analysis results of orebody spatial structure has found that Cu content has non-uniform change, regional anisotropic and north-south (0±22.50) is the direction, which has the biggest change, and anisotropic index is around 1.3. The results indicate that the exploration line direction should be north-south (the current direction is EN-WS), and the density for estimating reserve has category 121 (Measured/Proved): (23 x 30) meters and 122 (Indicated/Controlled): (46 x 60) meters. The mineral reserve are estimated according to sub-blocks and points in the orebody-space. The results obtained by Kriging have reliable results, variance estimaton is small, and the difference from of exploited data is approximately 5.6%.

A 3-D NUMERICAL DAM-BREAK WAVE MODEL BASED ON SMOOTHED PARTICLE HYDRODYNAMICS METHOD

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ABSTRACT

The paper presents numerical simulations of free surface flows induced by a dam break water flood wave. Smoothed particle hydrodynamics method (SPH) was used as a tool for numerical simulation of the problem. Smoothed particle hydrodynamics is a Lagrangian meshless particle method. It is one of the best method for simulating violent free surface flows in fluids and solving large fluid deformations. Dam breaking is a typical example of these problems. The basis of SPH was reviewed, including some techniques for governing equation resolution. A three dimensional analysis of fluid-structures interaction were carried out demonstrating acceptable agreement of the numerical simulations with published experiments. These results provide a good foundation to evaluate the accuracy and stability of the SPH implementation for modeling the interaction between free surface flow and structures.

RESEARCH OF INFLUENCE OF NOISE POLLUTION ON THE VALUE OF THE THRESHOLD CURRENT TANGIBLE

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ABSTRACT

Stable safety while working on electrical installations can be achieved by following the rules of the electrical safety. Today maximum permissible levels of touch voltage and electric current flow through any part of a person's body are established by Russian Federation GOST system 12.1.038-82. Unfortunately, recommended by International Electrotechnical Commission (IEC) maximum allowable amount of electric current and voltage level do not take into account interaction between said electric current and other physical factors; noise, in particular. The influence of sound frequency and its pressure level on body resistance has been proven earlier in thesis by V.V. Katz. Studies of the noise effects on the value of the threshold current tangible have been renewed in laboratories of Life Safety Department in South Ural State University. To obtain reliable results, testing facility that includes anechoic chamber, sources of simulated voltages and noise and a set of recording instruments was designed and built. As a rule, noise influence on electrotechnical personnel varies depending on noise level or/and the duration of its impact. According to modern theories, indirect noise influence on various organs and systems through central nervous system has to be considered. Differential evaluation of noise pollution and its correlation with emerged effects can be obtained with the usage of the dose approach. First of all there were conducted studies, in which frequency of the applied voltage (f) was to 50 Hz. Voltages and currents that caused sensations before and during 97 dB noise affections were measured. Obtained dependence led to questioning previous researches results of the necessity of reducing the amperage of tripping protection devices. At the same time electrical resistance changes of human body were being studied. According to those researches, no functional dependence between fluctuations in the magnitude of the resistance of human body to electric current flow and constant noise affection were found. Taking into account that contradiction, additional studies of primary electrical safety criteria for cases when exposed to high frequency noise pollution were conducted.

MODELLING OF A DOUBLE-TRACK RAILWAY CONTACT SYSTEM ELECTRIC FIELD INTENSITY

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ABSTRACT

Working conditions of personnel that serves contact system (CS) are affected by factors including health and safety, security and working hours (danger of rolling stock accidents, danger of electric shock strokes, work at height, severity and tension of work, increased noise level, etc.) Low frequency electromagnetic fields as part of both electric and magnetic fields are among of the most dangerous and harmful factors. These factors can affect not only the working personnel, but also a lot of people, who do not work with the contact system itself, but could be influenced by electromagnetic field as the result of their professional activity. People, who use public transport or live not far from the electrified lines, are endangered by these factors as well. There are results of the theoretical researches in which low frequency electric fields of railway contact system were designed with the use of mathematical and computer modelling. Significant features of electric field distribution near double-track railway in presence or absence of human body were established. The studies showed the dependence of low frequency electric field parameters on the distance to the track axis, height, and presence or absence of human body. The obtained data were compared with permissible standards established in the Russian Federation and other countries with advanced electrified railway system. Evaluation of low frequency electric fields harmful effect on personnel is the main result of this work. It is also established, that location of personnel, voltage and current level, amount of tracks and other factors influence electric fields of contact systems.

PROTECTION OF WORKERS AND THE THIRD PARTIES DURING THE CONSTRUCTION OF THE LINEAR STRUCTURES

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ABSTRACT

Ensuring non-threatening occupational health and safety (OHS) during works is one of the primary objectives for each construction. Work involving the most serious accidents in the construction industry includes earthworks and work on linear constructions. Due to the character of these constructions, there is the greatest threat to the public (so-called third parties). Linear constructions are characterized as a large construction site in a narrow lane alongside the constructed object works are usually take place during public lifecycle, there is a direct connection with the existing buildings and the impossibility of guarding the whole construction site. However, for linear constructions, many OHS problems can be avoided at the time of their design. The aim of this article is to introduce a new methodology, which has been implemented into the computer program of safety measures on linear constructions. Based on the experience of designing the constructions, their execution and the safety coordinator supervision, the basic types of linear structures, their location in the terrain, the conditions of implementation and other marginal conditions and influences were modelled. Basic safety information has been assigned to this basic information, which is strictly necessary for construction process. The safety provisions can be grouped according to type, eg technical, organizational and necessary documentation or by groups of provisions such as construction site safety provisions, transport safety provisions, earthworks safety provisions, etc. This is a multi-criteria selection of the given provisions. The aim of creating this program is a practical tool for designers, contractors and construction companies. The model can contribute to a sufficient awareness of these participants about technical and organizational provisions that contribute to meeting the requirements for safe work. The software for the selection of safety provisions is followed by a module that can calculate the necessary cost estimating using the actual calculation formula of the user. All software data are in accordance with European standards harmonized for the Czech Republic.

GEOMECHANICAL CHARACTERIZATION OF CARBONATE ROCK MASSES BY MEANS OF LASER SCANNER TECHNIQUE

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ABSTRACT

Knowledge of the geometrical and structural setting of rock masses is crucial to evaluate the stability and to design the most suitable stabilization works. The traditional survey techniques are often expensive, and present great difficulties related to logistics in accessing the sites, the high hazard for the operators, and the height of the rock faces, or simply beacuse of the wide extent of the rock walls to be examined. In this work we use the Terrestrial Laser Scanning (TLS) at the site of the Grave of the Castellana Caves, a famous show cave in southern Italy. The Grave is the natural access to the cave system, produced by the collapse of the vault of the original cave, due to upward progression of instabilities in the carbonate rock masses. It is about 55-m high, bell.shaped, and shows a maximum width of 120 m. Aim of the work is the characterization of carbonate rock masses from both the structural and geo-mechanical standpoints through the use of innovative survey techniques. TLS survey provides a product consisting of milions of geo-referenced points, to be managed in space, to become a suitable database for the morphological and geological-structural analysis. Studying by means of TLS a rock face, partly inaccessible or located in very complex environments, allows to investigate slopes in their overall areal extent, thus offering advantages both as regards safety of the workers and time needed for the survey. In addition to TLS, the traditional approach was also followed by performing scanlines surveys along the rims of the Grave, following the ISRM recommendations for characterization of discontuity in rock masses. A quantitative comparison among the data obtained by TLS technique and those deriving from the classical geo-mechanical survey is eventually presented, to discuss potentiality of drawbacks of the different techniques used for surveying the rock masses.

TRACER TESTS HISTORY IN THE ALBURNI MASSIF (SOUTHERN ITALY)

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ABSTRACT

The Alburni Massif (Campania, southern Italy) is among the most important Italian karst areas, due to high number of caves (about 300), with several karst systems reaching depth of 500 m, and development of some kilometers. This remarkable karst is mainly related to three geological factors: presence of highly karstifiable and (in average) low-fractured Cretaceous and Tertiary limestones; peculiar morphological and structural conformation, with four main faults bounding the massif, thus forming a wide highplain with a variety of infiltration sites; presence on the highplain of blind valleys and small catchments on flysch deposits, which surface hydrology feeds the many swallets at the contact with the limestone rocks. The Alburni Massif represents an important hydrogeological structure, with a potential of about 10 mc/sec. Three basal spring systems are the main outcomes (Castelcivita, Tanagro and Pertosa) while other minor systems are located at higher elevation, as the Auso spring. The Castelcivita and Pertosa caves, located on the opposite foothills (respectively, SW and NE) of the Alburni Massifs, are of particular importance also from the touristic standpoint and the local economy, since Castelcivita became a show cave in 1930, followed two years later by Pertosa. Since 1950 many cavers have explored the Alburni Massif, due to the high potential of overall karstification, estimated in about 1300 m, and to the presence on the southern slope of the massif of the spectacular Auso spring. In this paper we summarize the tracer tests carried out in the Alburni Massif, with the aim to update the available hydrogeological data, with particular regard to the most recent explorations and tests, carried out during the last 5 years, which brought significant and new data to the overall knowledge of this remarkable karst area of southern Italy.

REMOVAL OF CYANOBACTERIA AND CYANOTOXINS FROM LAKE WATER BY COMPOSITES OF BENTONITE WITH MICELLES OF THE CATION OCTADECYLTRIMETHYL AMMONIUM

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ABSTRACT

Cyanobacteria and their toxins present potential hazard to consumers of water from lakes, reservoirs and rivers, thus their removal via water treatment is essential. The capacity of nano-composites of Octadecyltrimethyl-ammonium (ODTMA) complexed with clay to remove cyanobacterial and their toxins from laboratory cultures and from lake water, was evaluated. Column filters packed with micelles of ODTMA complexed with bentonite significantly reduced the concentration of cyanobacteria cells or filaments and their corresponding toxins from laboratory cultures. Fluorescence measurements demonstrated that cyanobacteria cells and filaments disintegrated and lost their metabolic activity (photosynthesis) upon exposure to the micelle (ODTMA)-bentonite complex (ED50 estimated at 0.1 mg/L), or ODTMA monomers (estimated ED50 ranged between 0.05 and 0.1 mM). The micelle (ODTMA)-bentonite complex efficiently removed cyanobacteria toxins (micocystins and cylindrospermopsin) with an exceptional high removal rate of microcystins. The effectiveness of the complex in elimination of cyanobacteria was further demonstrated with lake water containing cyanobacteria and other phytoplankton species. These results and model calculations suggest that filters packed with granulated composites can secure the safety of drinking water in case of a temporary bloom event of toxic cyanobacteria.

SLOPE INSTABILITY IN CALCARENITE ROCK MASS

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ABSTRACT

Pliocene and Pleistocene calcarenite deposits crop out widely in the Apulia region of South-Eastern Italy, unconformably covering the Cretaceous limestone bedrock. Many features deriving from the combination of the widespread karst processes and of the morphological evolution can be observed both along the coastlines and within the main remnants of the ancient hydrographic network, represented by deep gorges, locally called gravine. In particular, the vertical flanks of these gorges, reaching heights up to some tens of meters, are intensely affected by a variety of instability processes, such as falls, different types of topples, wedge failure, slides, etc. The overall situation is strongly complicated due to presence of natural caves and anthropogenic cavities. These latter are arranged in several stories, so that instability in one cavity might have direct repercussions on those nearby. Further, many caves of artificial origin are of great historical and cultural value, having used as worship sites, and showing the walls decorated with several frescoes. This adds to the naturalistic value of the area a remarkable cultural heritage to preserve. In this work, we present the analysis on selected sites in the Gravina di Petruscio, at Mottola (Taranto province), through detailed field surveys, geotechnical data and implementation of stability analysis. The analyses performed are aimed at defining a zonation of the areas most susceptible to instability in the Gravina, with the goal to provide useful data for the safeguard of the site and its most proper touristic valorization.

FIRE RESISTANCE OF THE LARGE AREA CROSS LAMINATED TIMBER PANELS

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ABSTRACT

Wooden structures are increasingly used for residential buildings. A common and often published reason to avoid wooden structures is insufficient fire resistance, which reduces the bearing capacity. For this reason, composite sandwich structures began to be designed to eliminate some of these drawbacks. Recently, the trends are returning to the original wood variant as a solitaire and the search for technological means to improve the properties of wooden constructions. Many timber structure technologies are known, however recently constructions made from cross laminated timber (CLT) panels has been used very often. CLT panels, also known as X-LAM and they currently gaining popularity in the Europe. In the case of CLT panels composed of several layers of boards, we can speak of a certain advantage, because after burning of the surface layer and drying of the subsurface layer of the boards, the oxygen is not drawn to the unburned wood for further combustion and thus the burning process ceases. This CLT panels do not need to be specially modified or coated with fire resistant materials, although usually presented solution is to e.g. coating from gypsum-fiber fire resistant boards due to standards. This paper presents the new methodology of the assessment of the load-bearing perimeter walls of the CLT panels without the use of the inner lining fire protection to ensure the required fire resistance according to European standards, also harmonized for the Czech Republic construction industry. The calculations were verified through laboratory tests. The test results shows that better parameters can be achieved to classify the structure classification from a fire resistance point of view. The aim of the article is to demonstrate based on the assessment and testing by accredited laboratory the possibilities of using CLT panels for the construction of multi-storey as well as multi-purpose buildings in the Czech Republic.

BIM-BASED TIMBER STRUCTURES REFURBISHMENT OF THE IMMOVABLE HERITAGE LISTED BUILDINGS

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ABSTRACT

The use of Building information model (BIM) design tools is no longer an exception, but a common issue. When designing new buildings or complex renovations using BIM, the benefits have already been repeatedly published. The essence of BIM is to create a multi-dimensional geometric model of a planned building electronically on a computer, supplemented with the necessary information in advance of the construction process. Refurbishment is a specific process that combines both - new structures and demolished structures, or structures that need to be dismantled, repaired, and then returned to the original position. Often it can be historically valuable part of the building. BIM-based repairs and refurbishments of the constructions, especially complicated repairs of the structures of roof trusses of immovable heritage listed buildings, have not yet been credibly presented. However, the use of BIM tools may be advantageous in this area, because user can quickly response to the necessary changes that may be needed during refurbishments, but also in connection with the quick assessment and cost estimation of any unexpected additional works. The paper deals with the use of BIM in the field of repairs and refurbishment of the buildings in general. The emphasis on monumentally protected elements was priority. Advantage of the proposal research is demonstrated on case study of the refurbishment of the immovable heritage listed truss roof. According to this study, this construction was realized in the Czech Republic. Case study consists of 3D modelled truss parts and the connected technological workflow base. The project work was carried out in one common model environment.

TREE-RING WIDTHS AND SNOW COVER DEPTH IN HIGH TAUERN

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ABSTRACT

The aim of the study is to examine the dependence of Norway spruce tree-ring widths on the snow cover depth in High Tauern mountains. The average standardized tree-ring widths indices for Nowary spruce posted by Bednarz and Niedzwiedz (2006) were taken into account. Increment cores were collected from 39 Norway spruces growing in the High Tauern near to the upper limit of the forest at altitude of 1700-1800 m, 3 km from the meteorological station at Sonnblick. Moreover, the maximum of snow cover depth in Sonnblick (3105 m a.s.l.) for each winter season in the period 1938/39 to 1994/95 (57 winter seasons) was taken into account. Bednarz and Niedzwiedz (2006) have obtained good results in investigating of correlations of tree-ring widths and temperature and precipitation on Sonnblick. Dependencies of tree-ring widths on the snow cover depth were tested so far very rare. The exceptions are studies of dendrochronological measurements and snow avalanches. The main results of the research are as follows: (1) tree-ring widths in a given year (e.g. 1960) does not reveal statistically significant dependency on the maximum snow cover depth observed in the winter season, which ended this year (i.e. 1959/60); (2) however, the tested the relationship is statistically significant in the case of correlating tree-ring widths in a given year (e.g. 1960) with a maximum snow cover depth in a season of previous year (i.e. 1958/59). The correlation coefficient for the entire period of study is not very high (r=0,27) but shows a statistical significance at the 0,05 level; (3) the described relationship is not stable over time. Method of moving 30-year correlation showed no significant dependencies till 1942 and after 1982. However, during the period of 1943-1981 the values of correlation coefficient for moving 30-year periods are statistically significant and range from 0,37 (1944-1973) to 0,45 (1946-1975). For the whole period (39 years) the correlation is 0,34 (significant). For further research only the period 1943-1981 was taken into account. It was divided into calibration period (1943-1962) and verification one (1963-1981). The regression equation was constructed, the standard estimation error, the coefficient of determination and the differences between the observed and reconstructed values were calculated. Due to quite short period of statistically significant correlations and not very strict dependencies, the attempt to reconstruct the snow cover on Sonnblick for the period before regular measurements was given up. The relationship described in (2) is probably associated with the reaction of the tree-ring widths to provide by underground runoff water from the slowly melting snow, infiltrating into the ground and flowing down slowly from summits to the upper limit of the forest. Causes of instability of relationship described in (3) are not entirely clear. In the first period (1939-1942) it could contribute to the inaccurate snow cover measurements during the Second World War. After 1981 the cause of the insignificant correlation may be quite rapid climate change resulting in an increase of temperature, which was this time more important for the tree-ring widths (the so-called divergence phenomenon).

EVALUATING A SIMPLIFIED ENERGY BALANCE SNOW MELT MODEL FOR GENERATING OPERATIONAL SNOW DEPTH MAPS OF CZECHIA

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ABSTRACT

Maps and time series datasets of snow-covered area, snow depth, and snow water equivalent are critical for water resources management, climatology, transportation, and outdoor recreation in snow-dominated regions. As a region with a long tradition of snow recreation, high population density, and fast changes in the spatial and temporal extent of the snow, Czechia is an ideal study area for evaluating new snow depth mapping methods. For operational mapping, a network of 100 - 200 meteorological stations with manual snow depth observations is currently being used by the Czech Hydrometeorological Institute (CHMI) to generate daily snow depth maps. A much larger number of automated sensors (> 500) without measured snow depth, but with simultaneous precipitation and temperature measurements, are available online. In this study, a simplified energy balance snowpack model (SnowMelt model from the EcoHydRology R package) has been used to calculate a daily time series of snow water equivalent and snow depth at the500 available sites in various climate regions of Czechia in the period 2012 - 2017. The inputs of the model are maximum daily air temperature, minimum daily air temperature, daily precipitation and site latitude. An optional input is wind speed. While wind speed data is not available at most stations, it was reconstructed from numerical weather model reanalyses. The results of the model are compared to measurements at 70 sites with available daily snow depth data. Without calibration, the model provides a good prediction of the timing of snow accumulation and snow melt periods at higher elevation sites. In most cases, the model underestimates the overall snow depth, which may be due to the missing precipitation values or inaccurate measurement of solid precipitation. At lowland sites with more intermittent snowpack, the model is less accurate and unable to simulate many short-duration snow events. Using hourly precipitation and temperature data improves model accuracy at the lowland sites. The model performance is further improved by calibrating the slope, aspect and ground albedo parameters. The presented method results in increasing the number of sites with snow data. A higher number of sites can improve the spatial resolution and accuracy of operational snow depth maps of Czechia and surrounding regions.

A PROPOSED METHOD FOE MEASURING THE IMPACT OF HEATING ON THE SETTING TIME OF CEMENT, TERMO-VICAT APPARATUS

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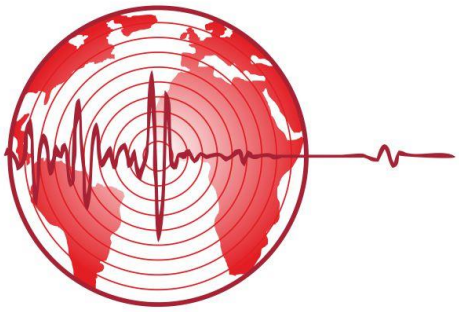
ABSTRACT

The Vicat experiment is the standard technique in accordance to ASTM-C-191 and BS-12 requirement to determine the setting time (hardening) of cement paste. In this method, a needle (with pre-determined mass of 300g and a particular size needle) penetrates a mould filled with a cement/water mixture by means of free-fall at different time intervals. Once the cement hardens the needle will penetrate less deep every time of fall until such time that it cannot continue to penetrating any more. In these two methods, the temperature of cement paste is not taken as a variable parameter. In addition, the influence of librated heat of cement hydration is not taken into consideration. Generally, the heat of cement hydration is very noticeable in dam engineering or any application of cement or concrete in bulk on site. To take into consideration the influence of various temperatures upon setting time of cement, a modified Vicat apparatus (Termo-Vicat) is proposed in this paper. By the application of this apparatus, engineers are able to consider the impact of various temperatures upon setting time and hardening characteristics of cement paste, including: standard consistency, initial setting time, and final setting time of cement pastes. This apparatus consists of a special developed mould with some heating element inside which applies a constant temperature on cement paste. On its Vicat T-G model, one is able to apply different temperature gradients to cement paste. With the use of XRD and SEM experiments and application of this modified Vicat apparatuses, one is able to investigate the influence of hydration heating on the micro-structure of cement paste and concrete. In this paper the general characteristics of the proposed Vicat apparatus is introduced and a part of experimental results on its application are addressed in details.



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