



THE ATHENS INSTITUTE FOR EDUCATION AND RESEARCH

# Abstract Book:

3<sup>rd</sup> Annual International Conference on

**Geology**

5-8 June 2017, Athens, Greece

Edited by

Gregory T. Papanikos

2017



Abstracts  
3<sup>rd</sup> Annual International  
Conference on  
Geology  
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## Preface

This book includes the abstracts of all the papers presented at the 3<sup>rd</sup> *Annual International Conference on Geology, 5-8 June 2017*, organized by the Athens Institute for Education and Research (ATINER). In total 18 papers were submitted by 20 presenters, coming from 14 different countries (Brazil, China, Egypt, France, Hungary, Iran, Malaysia, Mexico, Morocco, Namibia, Poland, Romania, Slovakia, Turkey). The conference was organized into 9 sessions that included a variety of topic areas such as Geological Exploration, Geological Characterization, Environmental Considerations and Sustainability of Water Resources and more. A full conference program can be found beginning on the next page. In accordance with ATINER's Publication Policy, the papers presented during this conference will be considered for inclusion in one of ATINER's many publications.

The purpose of this abstract book is to provide members of ATINER and other academics around the world with a resource through which to discover colleagues and additional research relevant to their own work. This purpose is in congruence with the overall mission of the institute. ATINER was established in 1995 as an independent academic organization with the mission to become a forum where academics and researchers from all over the world could meet to exchange ideas on their research and consider the future developments of their fields of study.

It is our hope that through ATINER's conferences and publications, Athens will become a place where academics and researchers from all over the world regularly meet to discuss the developments of their discipline and present their work. Since 1995, ATINER has organized more than 400 international conferences and has published nearly 200 books. Academically, the institute is organized into seven research divisions and 38 research units. Each research unit organizes at least one annual conference and undertakes various small and large research projects.

For each of these events, the involvement of multiple parties is crucial. I would like to thank all the participants, the members of the organizing and academic committees, and most importantly the administration staff of ATINER for putting this conference and its subsequent publications together.

**Gregory T. Papanikos**  
**President**





**FINAL CONFERENCE PROGRAM**  
**3<sup>rd</sup> Annual International Conference on Geology,**  
**5-8 June 2017 Athens, Greece**

**PROGRAM**

**Conference Venue: Titania Hotel, 52 Panepistimiou Avenue, Athens, Greece**

**C O N F E R E N C E P R O G R A M**

**08:00-09:00 Registration and Refreshments**

**09:00-09:30 (Room D-10<sup>th</sup> Floor) Welcome and Opening Address**

Gregory T. Papanikos, President, ATINER.

**09:30-11:00 Session I (Room C-10<sup>th</sup> Floor): Earth Sciences**

**Chair:** Olga Gkounta, Researcher, ATINER.

1. Khadija Elhariri, Professor, Université Cadi Ayyad, Morocco, Bertrand Lefebvre, Claude Bernard Lyon 1, France. Fezouata Biota: The New Chapter between the Cambrian Explosion and the Great Ordovician Biodiversification (Central Anti-Atlas, Morocco).
2. Vsevolod Yutsis, Professor, Instituto Potosino de Investigacion Científica y Tecnológica, A.C., Mexico, Juan Martin Gomez Gonzalez, Researcher, Universidad Nacional Autonoma de Mexico, Mexico, Angel Francisco Nieto Samaniego, Researcher, Universidad Nacional Autonoma de Mexico, Mexico, Erika Nallely Lopez Valdivia, Postgraduate Student, Universidad Nacional Autonoma de Mexico, Mexico & Martha Jeannette Alcantar Pena, Instituto Potosino de Investigacion Científica y Tecnológica, A.C., Mexico. Upper Crustal Structure of Sierra Gorda de Queretaro, Mexico, Derived from Gravity and Magnetic Data.
3. Shujian Xu, Professor, Linyi University, China & Min Zhao, Associate Professor, Linyi University, China. OSL Chronology of Loess in Shandong Area during the late Quaternary.
4. Norbert Magyar, Senior Lecturer, Eötvös Loránd University, Hungary, Balint Polonkai, PhD Student, Eötvös Loránd University, Hungary, József Kovács, Assistant Professor, Eötvös Loránd University, Hungary, Ágnes Görög, Assistant Professor, Eötvös Loránd University, Hungary & Emese Réka Bodor, Research Fellow, MFGI, Geological and Geophysical Collections, Hungary. Classification of Scutellidae Species using Combined Cluster and Discriminant Analysis.

**11:00-12:30 Session II (Room C-10<sup>th</sup> Floor): Geological Exploration, Characterization and Modelling**

**Chair:** Vsevolod Yutsis, Professor, Instituto Potosino de Investigacion Científica y Tecnológica, A.C., Mexico.

1. Andrei Bala, Senior Research Geophysicist, National Institute for Earth Physics, Romania. Crustal Models and Active Fault Systems in Western Part of Romania.

**12:30-14:00 Session III (Room C-10<sup>th</sup> Floor): Geomorphology and Urban Development**

**Chair:** Paweł M. Leśniak, Professor, Polish Geological Institute – National Research Institute, Poland.

1. Reza Zakerinejad, Post-doc, Isfahan University of Technology, Iran, Saeid Soltani, Isfahan University of Technology, Iran, Koursh Shirani, Isfahan Agricultural and Natural Resources Research and Education Center, Isfahan, Iran & Michael Maerker, Department of Earth and Environmental Sciences, Pavia University, Italy. Integrated Assessment of Gully Erosion Processes, Using Multispectral Remote Sensing, Stochastic Modelling, and GIS-based Morphotectonic Analysis; A Case Study in the Southwest of Iran.
2. Luana Nunes Martins de Lima, PhD Student, Universidade de Brasília, Brazil & Everaldo Batista da Costa, Professor, Universidade de Brasília, Brazil. Between Ruins and Permanences: The Patrimony in the Urbanization's Specificity of Goiás (Brazil).

**14:00-15:00 Lunch**

**15:00-16:30 Session IV (Room C-10<sup>th</sup> Floor): Characterization and Modelling of Oil Reservoirs**

**Chair:** Oana-Ramona Ilovan, Associate Professor, Babeş-Bolyai University Cluj-Napoca, Romania.

1. Luofu Liu, Professor, China University of Petroleum, China, Fei Xiao, Student, China University of Geosciences, China & Fei Xiao, Staff, Shenyang Geological Survey Center, China. Geochemical Characteristics of Aromatic Hydrocarbons in the Crude Oils from the Chepaizi Area, Junggar Basin, China.
2. Mohammad Hossein Adabi, Professor, Shahid Beheshti University, Iran, Parastoo Safaei, PhD Student, Azad University North Branch, Iran & Mohammad Reza Kamali, Associate Professor, Research Institute of Petroleum Industry, Iran. Petrography and Microfacies of the Fahliyan Formation in Doroud and Abuozar Oil Fields, Persian Gulf.

**18:00-19:30 Session V (Room E-10<sup>th</sup> Floor): A Roundtable Discussion on Teaching Urban Planning and Architecture in a Global World**

**Chair:** Nicholas N. Patricios, Professor & Dean Emeritus, School of Architecture, University of Miami, USA.

1. **Lina Martínez**, Professor, Universidad Icesi Cali, Colombia. Happy City.
2. **Takashi Nakamura**, Associate Professor, Tokyo City University, Japan. Teaching Urban Planning in Japan.
3. **Alan Frishman**, Professor of Economics, Hobart and Wm. Smith Colleges, USA. Teaching an Urban Economics/Urban Studies Class in the U.S.
4. **Anissa Benaiche**, Researcher Associate, Nantes University, France. General Overview of Urban Planners Training In France.
5. **Giulia Pellegrini**, Associate Professor, University of Genoa, Italy. Urban Planning Response-bilities: City, Landscape and Resilience.

For details on the discussion please [click here](#).

**21:00-23:00 The Pragmatic Symposium of the Conference as Organized in Ancient Athens with Dialogues, Food, Wine, Music and Dancing but fine tuned to Synchronous Ethics.**

**Tuesday 6 June 2017**

**07:30-10:30 Session VI: An Educational Urban Walk in Modern and Ancient Athens**

**Chair:** Gregory Katsas, Vice President of Academic Affairs, ATINER & Associate Professor, The American College of Greece-Deree College, Greece.

Group Discussion on Ancient and Modern Athens.

Visit to the Most Important Historical and Cultural Monuments of the City (be prepared to walk and talk as in the ancient peripatetic school of Aristotle)

**11:00-12:30 Session VII (Room C-10<sup>th</sup> Floor): A Panel on Application of Isotope Hydrology Techniques in Assessing Water Resources**

**Chair:** Ibrahim Salaheldin Khedr, Head of GIS and RS Unit, National Water Research Centre (NWRC), Egypt.

1. Paweł M. Leśniak, Professor, Polish Geological Institute – National Research Institute, Poland, Zbigniew Nowicki, Emeritus, Polish Geological Institute – National Research Institute, Poland and Andrzej Wilamowski, Researcher, Polish Geological Institute – National research Institute, Poland. Mean Residence Time of Groundwater in the Vistula and Narew Basins, Poland, by Tritium Approach
2. Mathieu Sebilo, Assistant Professor, Sorbonne Universités, France. Organic Nitrogen Pool and Nitrate Leaching from Agricultural Soils: Isotopic Tracing ( $\delta^{15}\text{N-NO}_3^-$  and  $\delta^{18}\text{O-NO}_3^-$ ).

3. Heike Wanke, Senior Lecturer, University of Namibia, Namibia. Isotopic Characterization of Groundwater from Shallow and Deep Aquifers in Comparison to Surface Water and Precipitation in the Cuvelai Etosha Basin, Namibia.
4. Mohammad Muqtada Ali Khan, Senior Lecturer, Universiti Malaysia Kelantan, Malaysia, Kishan Raj Pillai A/L Mathialagan, Post Graduate Students (Master Level), Universiti Malaysia Kelantan, Malaysia & Zameer Ahmad Shah, Geoscientist, Central Geological Services, Group. Isotope Studies on Mechanisms of Groundwater Recharge in parts of Kelantan Malaysia.
5. Juraj Michalko, Isotope Geologist, Hydrogeologist, State Geological Institute of Dionýz Stúr, Slovakia & Erika Kovacova, Hydrogeologist, State Geological Institute of Dionýz Stúr, Slovakia. A Conceptual Model of the Groundwater in the Pernek Reservoir (Slovakia) Based on the Distribution of Sulphur Isotopes.

**12:30-14:00 Session VIII (Room C-10<sup>th</sup> Floor): Environmental Considerations and Sustainability of Water Resources**

**Chair:** Mathieu Sebilou, Assistant Professor, Sorbonne Universités, France.

1. Ibrahim Salaheldin Khedr, Head of GIS and RS Unit, National Water Research Centre (NWRC), Egypt & Osama Abdel-Raouf, Professor, National Water Research Centre (NWRC), Egypt. Integrated Surface and Subsurface Studies for Water Resources Evaluation in Wadi Dahab Basin, Sinai, Egypt.
2. M. Ali Khalvati, Assistant Professor, Bogazici University, Turkey, M. Meric Tunali, PhD Student, Bogazici University, Turkey, Turgut T. Onay, Academic Member, Bogazici University, Turkey & Orhan Yenigun, Faculty Member, Bogazici University, Turkey. Remove Heavy Metal by Phytoremediation Technique via Microbial Association in Plant Rhizosphere from Contaminated Soil.

**14:00-15:00 Lunch**

**15:00-16:30 Session IX (Room C-10<sup>th</sup> Floor): A Panel on Territorial Identity and Development**

**Chair:** M. Ali Khalvati, Assistant Professor, Bogazici University, Turkey.

1. Paul Mutica, Associate Professor, Technical University of Cluj-Napoca, Romania. Two Decades of Evolution in Cluj-Napoca's Suburbs.
2. Oana-Ramona Ilovan, Associate Professor, Babeş-Bolyai University Cluj-Napoca, Romania. Roşia Montană, Romania. Territorial Values and Development Initiatives.

**21:00- 22:30 Dinner**

**Wednesday 7 June 2017**

**Educational Island Tour: (Details during registration)**

**or**

**Mycenae and Epidaurus Visit: (Details during registration)**

**Thursday 8 June 2017**

**Delphi Visit: (Details during registration)**

**Mohammad Hossein Adabi**

Professor, Shahid Beheshti University, Iran

**Parastoo Safaei**

PhD Student, Azad University North Branch, Iran

&

**Mohammad Reza Kamali**

Associate Professor, Research Institute of Petroleum Industry, Iran

## **Petrography and Microfacies of the Fahliyan Formation in Doroud and Abuzar Oil Fields, Persian Gulf**

The Fahliyan Formation is a carbonate sequences with Lower Cretaceous (Berriasian to Hauterivian) age which was deposited in the Zagros sedimentary basin. This formation has been studied in two underground sections (D1, D3, D101 wells) in Doroud Oil Field, and Abuzar well#1 in Abuzar Oil Field which is part of South Pars Oil Fields (southern Iran). In this research, 355 thin sections of the three wells in Doroud Oil Field, and 100 thin sections in Abuzar Oil Field has been studied by polarizing microscope for determining the petrography, microfacies and diagenetic processes. Thin sections were stained by Alizarin-Red solution and potassium ferricyanide for determination of calcite and dolomite. Flugel (2004) and Wilson (1975) have been used to interpret microfacies and Dunham (1962) classification for carbonate textures.

In the Fahliyan Formation, non-skeletal grains consist of ooids, peloids, intraclasts and oncoids. Skeletal grains composed of corals, gastropods, bivalves, echinoderms, algae and foraminifera. Petrographic studies and facies analysis led to the identification of 10 microfacies that have been deposited in four facies belts, including tidal flat, lagoon (leeward and seaward lagoon), shoal and open marine sub-environments. Most of the studied samples are have packstone and wackestone texture related to the lagoonal facies belt. Porosity in the carbonate facies are relatively high and mainly consist of interparticle, vuggy, channel and fracture. The high porosity in carbonate sequences indicates a good potential for exploration of hydrocarbon in this formation.

**Andrei Bala**

Senior Research Geophysicist, National Institute for Earth Physics,  
Romania

**Crustal Models and Active Fault Systems in Western Part of  
Romania**

The most significant seismicity in Romania is located in a relatively small area - the Vrancea seismogenic zone, where 2-3 intermediate depth strong earthquakes ( $M_w > 7.0$ ) occur in a century. Although the crustal seismicity is dispersed in several zones of country, only in a few areas the observed magnitudes exceeded  $M_w = 6.0$ . Nevertheless some crustal earthquakes that occurred in the past have resulted in damages and even casualties. These facts imposed the taking into account of crustal seismicity in the seismic hazard mapping.

Crustal seismicity in Romania is distributed within some belts located along of Carpathians and the Pannonian depression having a more significant concentration in the Vrancea crustal area and in the front of Eastern Carpathians bend, in the Fagaras Mountain area, in the Danubian area, Banat, Crisana, Maramures and North Dobrogea regions.

A summary on the crustal seismic activity beneath the western part of Romanian is presented pointing out the most significant events known from both historical and instrumental records. The observed crustal seismicity did not exceed  $M_w = 5.6$  excepting the Fagaras area where the strongest events reached up to  $M_w = 6.5$ . For each crustal seismogenic zone the main fault systems which can account for the local seismicity are presented.

This study presents a correlation of seismicity data with the local tectonics. A special attention is focused on the Transylvanian Basin and on the Pannonian sector where a correlation of seismicity with deep structure is better documented.

**Khadija Elhariri**

Professor, Université Cadi Ayyad, Morocco

**Bertrand Lefebvre**

Claude Bernard Lyon 1, France

## **Fezouata Biota: The New Chapter between the Cambrian Explosion and the Great Ordovician Biodiversification (Central Anti-Atlas, Morocco)**

The recent discovery of several Early Ordovician Lagerstätten in the Central Anti-Atlas of Morocco offers new insights into the first animal biodiversifications in Early Palaeozoic times. Indeed, the new Moroccan Lagerstätten are critical in unraveling the progressive settlement of primary marine ecosystems, soon after the emergence of animal world in the water column. Exceptionally preserved soft-bodied faunas are particularly abundant in early to mid-Cambrian times (e.g., Burgess, Chengjiang, Sirius Passet, Orsten), but far less common and associated to restricted environmental conditions in both late Cambrian and Ordovician times. The Lower Ordovician Fezouata, Lagerstätte from the Outer Feijas Group of Zagora area partly fills in this gap.

The complexity of existing biological systems, whatever their level of organization (organizations, communities, ecosystems) is the result of a long evolutionary history. The first steps in the establishment of this structure (Late Proterozoic, about 635Ma ago) are still little known. The two main subsequent steps, the Cambrian explosion (from 540 to 489Ma) and the Great Ordovician Biodiversification (489 to 443Ma) are more accessible and therefore, better documented. Thus, the Cambrian explosion is characterized by the implementation of major animal organization plans (phyla) and construction of the first complex marine ecosystems. The Great Ordovician Biodiversification results in an exponential development of biodiversity within each sub-phylum.

These two phases were traditionally considered independent due to the preservation of fauna and distinct Cambrian Paleozoic and a period of slower evolutionary dynamics (510-488Ma), called "Cambrian plateau" or "Dead Interval" initiated by an apparent extinction in the Middle Cambrian. However, this assumption of "Cambrian plateau» is challenged by the discovery of the Lower Ordovician deposits in the region of Zagora.

Although the majority of species in the different groups are still being described, the composition and organization of the Fezouata Biota not only provide increased insight into the systematic aspects, but

also offers more understanding of its palaeoecological context, as not only the mineralized remains are preserved (carapaces, shells, tests), but also soft tissue or mineralized fingerprints (appendages, nervous ganglia, digestive tract).

Recent studies have considerably clarified the biostratigraphic and paleo-environmental context of Fezouata Biota. Studies in progress (taphonomy, micropaleontology, geochemistry) attempt to further specify the paleo-environmental conditions of this unique and exceptional Konservat-Fossil-Lagerstätte, integrating SEM studies, tomography ..., trying to go back in time, and shed more light on this key period in the evolution of life.

**Oana-Ramona Ilovan**

Associate Professor, Babes-Bolyai University Cluj-Napoca, Romania

**Roşia Montană, Romania.  
Territorial Values and Development Initiatives**

In this paper, we present our recent research in Roşia Montană village, in Romania, a settlement known worldwide due to a crisis situation caused by a gold mining project and its possible environmental impact. At present, this project was stopped, but the community was strongly affected from a multitude of perspectives. After conducting semi-structured interviews with people (from inside and outside the community) having diverse social and economic initiatives in the village, we employed qualitative methodology to process the obtained information. The aim of our paper was to assess the impact of diverse initiatives, leadership roles and of territorial values on the development of this village, in a critical situation. The results of our research helped us answer the questions on who and why strives to find solutions for community development during crisis.



**M. Ali Khalvati**

Assistant Professor, Bogazici University, Turkey

**M. Meric Tunali**

PhD Student, Bogazici University, Turkey

**Turgut T. Onay**

Academic Member, Bogazici University, Turkey

&

**Orhan Yenigun**

Faculty Member, Bogazici University, Turkey

## **Remove Heavy Metal by Phytoremediation Technique via Microbial Association in Plant Rhizosphere from Contaminated Soil**

Study of soil beneficial microorganisms like arbuscular mycorrhizal fungi AMF was conducted in pot experiment. We aimed to investigate the potential of AM fungi in phytoremediation of heavy metals and its effect on soil fertility by determine the amount of glomalin-related soil protein (GRSP), a glycoprotein produced by arbuscular mycorrhizal fungi. This study was carried out to understand the role of two mycorrhizal species for the boosting of plant growth promoting in sorghum (*Sorghum bicolor* L.) and sunflower (*Helianthus annuus* L.) rhizosphere. In a greenhouse experiment both sorghum and sunflower plants were inoculated with two AM species *Glomus mosseae* and *Glomus intraradices* and left grown in a polluted soil with different copper concentrations (100, 500 and 1000ppm). The amount of heavy metal ( $\text{Cu}^{+2}$ ) observed by plant species, host plants' symbiosis potential with two different species of arbuscular mycorrhizal fungi (AMF) showed fact of strong correlation between higher pollution and AMF interaction in sunflower and sorghum. Rhizospheric (R) and nonrhizospheric (NR) soil of two representative plants (sorghum and sunflowers) was analyzed. Root association with two mycorrhizal species was high when  $\text{Cu}^{+2}$  increased for stance by 1000ppm. This was indicated in sunflower 59.8% and 56.55% in associations with *G. mosseae* and *G. interedices* respectively. The similar patent was observed in sorghum plants by 56.2% and 46.8% with *G. mosseae* and *G. interedices* under the same circumstances. The results showed a strong variability in the GRSP ( $10.1\text{mg g}^{-1}$ ), Cu content ( $21.04\text{mg kg}^{-1}$ ) exposed to 1000ppm  $\text{CuSO}_4$  in the sorghum plants associated with *G. mosseae*. This value was  $8.1\text{mg/g}^{-1}$  glomalin in sorghum plants integrated with *G. intraradices* grown in 1000ppm  $\text{CuSO}_4$ . Meanwhile on the 1000ppm  $\text{CuSO}_4$   $\text{Cu}^{+2}$  concentrations the sunflower plants these values were 9.7

and 8.9mg/g-1 glomalin when the sunflower plants inoculated with *G.mosseae* and *G. intraradices* respectively. A strong relationship between the GRSP with the soil Cu contents was found ( $r=0.89$ ). This study provides evidence on the role of the GRSP in Cu sequestration and suggests a highly efficient mechanism of AMF to mitigate stress leading to stabilization of soils highly polluted by mining activities.

**Mohammad Muqtada Ali Khan**

Senior Lecturer, Universiti Malaysia Kelantan, Malaysia

**Kishan Raj Pillai A/L Mathialagan**

Post Graduate Students (Master Level), Universiti Malaysia Kelantan,  
Malaysia

&

**Zameer Ahmad Shah**

Geoscientist, Central Geological Services, Group

### **Isotope Studies on Mechanisms of Groundwater Recharge in parts of Kelantan Malaysia**

The characteristics of  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$  in precipitation, groundwater and surface water have been used to understand the groundwater recharge conditions and flow system in shallow aquifers of Kelantan Malaysia. A comparison of the stable isotopic signatures of groundwater and precipitation of both pre and post-season indicates that the precipitations are the important source of groundwater recharge in the area. The recharge seem fluctuating from pre-season to post-season with later samples exhibiting comparatively narrow range and thus clearly depict the amount effect. The Surface water bodies in the area show significant deviation from LMWL and hence show evaporation effects. Aquifer in the area is isotopically heterogeneous showing enrichment towards north-west during post-season and south-east during pre-season.

**Ibrahim Salaheldin Khedr**

Head of GIS and RS Unit, National Water Research Centre (NWRC),  
Egypt

&

**Osama Abdel-Raouf**

Professor, National Water Research Centre (NWRC), Egypt

**Integrated Surface and Subsurface Studies for Water  
Resources Evaluation in Wadi Dahab Basin, Sinai, Egypt**

The integration between different studies contributing to the clear vision is curtail planners and decision makers. The GIS technique is an effective tool that can analyze the multi-data from the different sources. This paper aims to study the integration between the surface and subsurface studies to evaluate the water resources for enhancing in the master plan of the sustainable development of the study area.

The hydrological studied of drainage basins help in calculating the amounts of runoff, and the morphometric analysis of the drainage network lead to detecting the paths and direction of surface water. From the subsurface point of view, the geoelectric resistivity technique of geophysical investigation is applied for identifying the physical properties of the subsurface setting by extracting a set of maps for the aquifer properties'. In addition, the geoelectric subsurface sections were used in creating a morphological map for the top surface of basement rock, therefore the water paths under the surface was delineated.

A set of maps are constructed based on the vertical and lateral cross sections that induced from analysis of aeromagnetic and resistivity data. In addition, to the structural features that affected the groundwater behavior.

Results indicated that the integration of these two types of applications give a real imagination about the subsurface behavior of ground water through different kinds of surface and subsurface mapping. These maps display areas that suitable for agriculture, touristic activities and urban expansion and can be used as an input data for master plans of the area development strategies.

**Paweł M. Leśniak**

Professor, Polish Geological Institute – National Research Institute,  
Poland

**Zbigniew Nowicki**

Emeritus, Polish Geological Institute – National Research Institute,  
Poland

**Andrzej Wilamowski**

Researcher, Polish Geological Institute – National research Institute,  
Poland

### **Mean Residence Time of Groundwater in the Vistula and Narew Basins, Poland, by Tritium Approach**

The alternatives to the current evaluations of groundwater mean residence time (MRT) i.e. the period of time from rainfall to groundwater drainage by rivers (sampling points) has been discussed. It has been substantiated that historical tritium content level in rivers being higher than in precipitation for over 50 years in Northern Hemisphere is reversed opening new pathway in evaluating MRT value of groundwater in catchments. A simple approach of evaluating groundwater MRT value for catchment based on average annual tritium content is introduced.

A systematic record of tritium content in precipitation for Poland is available from the Wola Justowska station nearby Krakow since 1974. A new approach is provided to better understand river-groundwater relations with data that has been obtained in the frame of activity of National Hydrogeological Survey of Polish Geological Institute – National Research Institute in the period of 2013-2015. Samples were taken from Vistula River in Warsaw once a week and once a month in a Zambski hydrometric station in Narew River.

Based on average weighted annual tritium content in precipitation and annual average in rivers the obtained MRT values are 6.5 and 5.7 years for Vistula River Basin (VRB) and Narew River Basin (NRB), respectively. NRB is a lowland and morphologically, geologically and hydrogeologically uniform basin. The derived MRT value of groundwater of 5.7 years is thus delineative for whole basin. Instead in VRB groundwater MRT of 6.5 years is a generalized value i.e. averaged over contributing groundwater residence times of the respective parts of the Vistula River Basin.

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## **Geochemical Characteristics of Aromatic Hydrocarbons in the Crude Oils from the Chepaizi Area, Junggar Basin, China**

The composition and distribution characteristics of aromatic hydrocarbons in the Chepaizi area of the Junggar Basin were analyzed using technology of gas chromatography-mass spectrometry (GC-MS). Based on that, the biological input, maturity of crude oils and sedimentary environment of the corresponding source rocks were determined and the origin types of crude oils were divided. Three types of oils are identified. Type I oils show a single model in the late retention time of the chromatogram of total aromatic hydrocarbons. The content of triaromatic steroid series is high, and the content of dibenzofuran is low. Maturity parameters related to alkyl naphthalene, methylphenanthrene and alkyl dibenzothiophene all indicate low maturity for the Type I oils. Type II oils have also a single model in the early retention time of the chromatogram of total aromatic hydrocarbons. The content of naphthalene and phenanthrene series is high, and the content of dibenzofuran is medium. The content of polycyclic aromatic hydrocarbon representing the terrestrial organic matter is high. The aromatic maturity parameters indicate high maturity for the Type II oils. Type III oils have a bi-model in the chromatogram of total aromatic hydrocarbons. The contents of naphthalene series, phenanthrene series and dibenzofuran series are high. The aromatic maturity parameters indicate medium maturity for the Type III oils. The correlation results of triaromatic steroid series fingerprint show that the Type I and Type III oils have similar source and are both from the Permian Wuerhe source rocks. Because of the strong biodegradation and mixing from other source, the Type I oils are very different from the Type III oils in aromatic hydrocarbon characteristics. The Type II oils have the typical characteristics of terrestrial organic matter input under oxidative environment, and are the coal oil mainly generated by the mature Jurassic coal measure source rocks. However, the overprinting effect from the low maturity

Cretaceous source rocks changed the original distribution characteristics of aromatic hydrocarbons to some degree.

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### **Classification of Scutellidae Species using Combined Cluster and Discriminant Analysis**

In modern research, the organization of records into homogeneous groups is common and important goal. The aim of this study is to present the applicability of a new grouping method (Combined Cluster and Discriminant Analysis-CCDA) to the field of palaeontology. CCDA combines two well-known classification methods: hierarchical cluster analysis and linear discriminant analysis. The main idea behind CCDA is the comparison of preconceived groupings obtained from hierarchical cluster analysis with random groupings. If the given preconceived grouping is better than the random ones, the samples are not homogeneous. CCDA has many advantages: it is able to handle every observed simultaneously, it gives an objective index number of the homogeneity and it has been implemented into the R statistical software.

The applicability of the method was tested on well preserved irregular sea urchin fossils of the family Scutellidae Hungarian Middle Miocene (Badenian). These sand dollars are relatively common fossils of the Leitha Limestone formed in the Parathetys, and play a very important role in the palaeoenvironmental reconstructions due to their ecological sensitivity. Despite the large number of specimens there are some unresolved issues concerning the taxonomical classification of Scutellidae. The obtained results can help to classify the species more precisely, which in turn provides opportunities for better palaeoenvironmental and palaeobiogeographical reconstructions.

Three species (*Scutellahungarica*, *Scutellapygmea*, *Scutellavindobonensis*) were assessed by CCDA based on morphological parameters. The results show that these species did not form homogeneous groups, there are significant differences between them.



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### **A Conceptual Model of the Groundwater in the Pernek Reservoir (Slovakia) Based on the Distribution of Sulphur Isotopes**

Formation and circulation of groundwater in the Pernek reservoir were evaluated coming out from relation of the surface water and groundwater and their qualitative characteristics previously. In this paper is existing conceptual model re-evaluated based on the last data about chemical and isotope composition of waters. The most important indicator in this process represents isotope composition of sulphatic sulphur of precipitation's water, ore main outflow water and groundwater of springs of the studied area. Distribution of sulphur isotopes clearly confirmed original conceptual model. As well suggests more generally valid regularity of dominant role of sulphid sulphur as source of sulphur in groundwater of Pernek reservoir contrary to the sulphur of secondary gypsum minerals in Neogene sediments.

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**Two Decades of Evolution in Cluj-Napoca's Suburbs**

Sixteen years ago, Cluj was little more than a post-socialist backwater town in one of the poorest countries in Europe. Despite having a University tradition, few westerners could really pinpoint it on the map and even fewer ventured here as tourists or students. This was partly the fault of local administration policy that emphasized an introvert and overly nationalistic attitude. Foreign investors were also deterred in their intentions to start a business here so the city fell behind many other Romanian cities that opened their doors to foreign capital.

All this was about to change radically in the few years that followed. In a slingshot effect, in just a short period of time, spanning from 2004, Cluj became known for its booming economy, high real estate value, it became the Romanian "Silicon Valley", a hub for youth culture and a home for many cultural events culminating in it being named European youth capital for 2015. All this meant that Cluj made up for its lack of progress the years before and made the existing city overcrowded. People, especially youngsters, decided that, in order to stay and work in Cluj, they had to move to the suburbs. The metropolitan area of Cluj experienced a continuous growth these years and real estate value skyrocketed to the highest level in the country, even above Bucharest.

The purpose of this paper is to offer a succinct overview of the development of these suburbs, all of them derived from former rural settlements, that grew more than ten times in just a few years. Was this quantitative growth matched by a qualitative increase in the welfare of Cluj's citizens or was it more the object of real estate speculation?

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### **Between Ruins and Permanences: The Patrimony in the Urbanization's Specificity of Goiás (Brazil)**

In Goiás, many cities founded in the mining cycle (colonial period), did not have their patrimony recognized, restored or maintained by organs and institutions of preservation, leaving few assets in the urban area. Cities which history reconstructs the process whereby modern values were fixed in the backcountry. The purpose of this article is to expose the context of analysis of Goiás's patrimony in relation to the colonial urbanization's specificity in this Brazilian state, showing how their condition of negligence is the result of processes that can be contextualized in history. The permanences of patrimony, however, are latent, and they do not express themselves only by historical materialities maintained in urban space, but above all, by the symbolic practices that nurture this space. The general objective of the doctoral thesis that bases this article, therefore, is to unveil the forms of resistance of the cultural patrimony in the cities established for research in Goiás (Pilar, Crixás and Porangatu), as well as the sense of *place* (*placeness*) attributed by memory in the symbolic-affective relation of the populations with their patrimony.

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### **Organic Nitrogen Pool and Nitrate Leaching from Agricultural Soils: Isotopic Tracing (d<sup>15</sup>N-NO<sub>3</sub>- and d<sup>18</sup>O- NO<sub>3</sub>-)**

Increasing nitrate contamination of surface and groundwaters is a problem in many intensive agricultural areas of the world, particularly in temperate climate zones. Nitrate concentrations are increasing in rivers and in aquifers since the middle of the 20<sup>th</sup> century, closely paralleling the increase of the use of synthetic fertilizers as well as the increase of atmospheric nitrate deposition.

It results contamination of drinking water resources in aquifers, eutrophication of freshwaters and coastal marine ecosystems.

However, measurements of the natural stable isotopic composition of nitrate (d<sup>15</sup>N & d<sup>18</sup>O) released from agricultural soils of the Seine catchment (France), receiving mainly inorganic nitrogen fertilizers, revealed that the d<sup>18</sup>O values of nitrate differed from those expected with the mixing of nitrate in fertilizers and atmospheric depositions.

This indicates that nitrate in the sub-root zone (one meter depth) are derived from nitrification of reduced nitrogen in the soil, instead of being directly transferred through the soil profile from applied fertilizers or atmospheric deposition.

Moreover, the δ<sup>15</sup>N values of nitrates were found to be different from those of nitrogen in inorganic fertilizers and atmospheric deposition, but similar to the d<sup>15</sup>N values of organic soil nitrogen.

We suggest that the internal cycle of nitrogen in soil integrated isotopic fractionation of different processes (volatilization, nitrification, denitrification) which control the load of nitrate delivered to surface waters and aquifers.

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## **Isotopic Characterization of Groundwater from Shallow and Deep Aquifers in Comparison to Surface Water and Precipitation in the Cuvelai Etosha Basin, Namibia**

The Cuvelai-Etosha Basin (CEB) is located in the central-northern part of Namibia and is part of the Cuvelai River Catchment. CEB is the most densely populated part of Namibia and it is economically one of the fastest growing areas of the country. Therefore sufficient water supply is very important. Parts of the CEB are provided with drinking water from the Kunene river, but in the more remote areas groundwater is the main source of drinking water. It is found in a complex system of stratified aquifers; shallow aquifers are often of a perched type and are accessed by hand dug wells up to 30 m deep. A multilayered regional aquifer is found below this.

A hydrochemical and stable isotope study ( $^2\text{H}$  and  $^{18}\text{O}$ ) was carried out in order to characterize available groundwater and to identify possible recharge mechanisms.

Samples were collected from 50 sites for surface water, from 46 hand dug wells and 6 deep boreholes. The latter were further combined with a database compiled from existing regional groundwater data. To characterize the precipitation in the study area 61 samples have been collected from 10 different sites. The observed isotopic compositions have been traced back to a potential source water using a simplified evaporation approach.

The precipitation is characterised by  $\delta^{18}\text{O}$ : -18.69 to +7.33 and  $\delta^2\text{H}$ : -136.6 to 49.9 and the local meteoric water line has a slope of 7.2. Surface water is characterized by  $\delta^{18}\text{O}$ : -3.9 to +22.75 and  $\delta^2\text{H}$ : -24.4 to +101.4 and the potential source water by  $\delta^{18}\text{O}$ : -7.4 to +1.8 and  $\delta^2\text{H}$ : -49.0 to +17.7. The groundwater of the perched aquifers is characterized by  $\delta^{18}\text{O}$ : -11.8 to +20.69 and  $\delta^2\text{H}$ : -90.7 to +78.6 and the potential source water has a composition of  $\delta^{18}\text{O}$ : -13.6 to +0.4 and  $\delta^2\text{H}$ : -9.2. to +7.7. The groundwater of the regional aquifers is characterized by  $\delta^{18}\text{O}$ : -9.5 to -6.5 and  $\delta^2\text{H}$ : -67.6 to -48.34 and the potential source water has a composition of  $\delta^{18}\text{O}$ : -10.4 to -7.4 and  $\delta^2\text{H}$ : 68.40 to -48.5.

The relative narrow range of isotopic composition of source water for the regional groundwater compared to the perched groundwater indicates that only specific, high intensity rain events lead to groundwater recharge to the regional aquifers. In addition, the comparison of the source waters of the regional groundwater compared

to the surface water indicates a stronger depletion of the first one and thus recharge of these aquifers in higher altitudes i.e. the Angolan highlands. These findings are to be integrated into the management and protection of these water resources.

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## **OSL Chronology of Loess in Shandong Area during the late Quaternary**

Chinese loess-palaeosol sequences archive detailed terrestrial records of paleoclimatic and paleoenvironmental changes, and can be correlated to glacial-interglacial cycles in the Quaternary period. Eolian sediments with varying thickness are widely distributed and well preserved in the Shandong area located near the lower reaches of the Yellow River. However, the eolian processes and their relevance to paleoclimatic change remains poorly understood due to the limited age control which hinders understanding of the origin and evolution of the eolian sediments. Based on detailed field investigation, 39 samples retrieved from 10 representative profiles from west to east throughout the Shandong area were dated using quartz optically stimulated luminescence (OSL). We use these samples to establish a spatial and temporal chronological framework. In addition, sediments of each profile were sampled for the analysis of grain-size.

Our dating results in combination with previous published ages on eolian deposits showed that: (1) The oldest eolian deposits in the Shandong area are in excess of 100 ka, while most of the loess was deposited after 100 ka, (2) the majority of Holocene loess has been eroded and (3) the sections also presented a varying loess accumulation rate during different depositional periods. The analysis of higher sedimentation rates is an indicator of the continental shelf desertification during the last glacier period.

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**Upper Crustal Structure of Sierra Gorda de Queretaro,  
Mexico, Derived from Gravity and Magnetic Data**

Sierra Gorda de Querétaro (SGQ) is a part of the Sierra Madre Oriental, a sub-meridional mountain structure, which crosses the Eastern Mexico. As general this area seismologically is not active, but some parts of the SGQ suffer of micro-seismic movements. The analysis of the local microseismicity recorded between November 2007 and September 2010, carried out with the LANDA temporary seismic network, composed of short-term digital seismographs, shows the registration of more than 3000 micro-earthquakes ( $\sim h < 10$  km and with  $ML < 3$ ).

This study is focuses to the analysis of potential methods (gravity and magnetics) with the goal to ask the answer the question about the cause and origin of this phenomenon. The analysis based on the Bouguer gravity and Magnetic (on land and aeromagnetic) anomalies reduced to pole. The standard corrections, e.g. instrumental drift, earth tides, latitude, elevation, IGRF (for magnetic field) were applied to obtained measurements. Data processing includes Fourier transformation, wave-length filters, upward and downward continuation, vertical and horizontal derivate, analytic signal, etc. As a result we discovered that the subsurface of this area consists of four geological-geophysical complexes differ by their densities and magnetic properties. The depth of gravity and magnetic basement was obtained from the power spector analysis. It varies from 1400 to 3400m. Geophysical lineaments suggest that there are two directions of basement linear elements: southwest-northeast and northwest-



southeast. We defined primary and secondary linear elements of potential fields, downstanding and upstanding blocks of basement. Analysis of isostatic gravity (Airy-Heiskanen model) show that the basement blocks are still in motion (are nor stable) and hence being a real threat for seismic stability of the area.

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**Integrated Assessment of Gully Erosion Processes, Using  
Multispectral Remote Sensing, Stochastic Modelling, and  
GIS-based Morphotectonic Analysis;  
A Case Study in the Southwest of Iran**

Water erosion and especially gully erosion is one of the most effective phenomena that leads to decreasing soil productivity and pollution of water resources in many part of the world. Soil erosion in arid and semi-arid areas in Iran is a major environmental threat. Soil erosion in form of gullies is very common especially in this country.

Gully erosion as one of the most intensive land degradation processes especially in large parts of Iran, is the main threat for agriculture and range land. Gully erosion is one of the most important kinds of water erosion that causes soil degradation and pollution of water resources in these areas especially in the southern Iran. Since in many national assessment approaches just qualitative models were applied the aim of this study is to predict the spatial distribution of gully erosion processes by means of different driving factor and GIS - based logistic regression in a case study in the southern of Iran. Terrain parameters have been used to predict the susceptible area. Therefore, we applied GIS and satellite image analysis techniques to derive input information for the stochastic models. The proposed methodology allows conducting a proper gully erosion assessment in order to identify the priority areas for soil conservation and land use management in the southern parts of Iran.