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Day-01 (May 08, 2023)

Keynote Session

Contrasting Hydrological Regimes in Two Adjoining Semi-Arid Areas, with Low Rain Intensities

Aaron Yair

Department of Geography, The Hebrew University of Jerusalem, Israel

Abstract:

The present study deals with the hydrology of two adjoining watersheds, located in an area where average annual rainfall is ~280 mm. One watershed is located in a loess covered area, and the second in a rocky area. Hydrological data collected in the loess area point to a very high frequency of channel flow. However, even in extreme rain events, peak discharges are extremely low, pointing to a limited contributing area. The explanation proposed is that runoff generation is limited to the channel area, where a quasi-permanent seal, very rich in dispersive clays, responds quickly to low rain intensities. The contribution of the adjoining hillslopes is negligible. The hydrological regime in the rocky area is opposite. The frequency of overland flow is very high. However, channel flow did not develop, even in an extreme rain event of 105 mm. with peak rain intensities of 90 mm/hr1 in two minutes. The hydrological dis-connectivity at the-hillslope-channel interface is explained by the local rainfall characteristics. Rainstorms are highly intermittent, and the concentration time required for a continuous flow, along a whole slope, is much longer than the duration of most effective intermittent rain showers. Data obtained limit the possibility of extrapolation hydrological data from one area to another, under the same rainfall regime.

Biography:

Aaron Yair Complete his Undergraduate studies (Geography) at the University of Paris (Sorbonne). Graduate and PhD studies (Geomorphology) at the Hebrew University of Jerusalem (Summa cum laude). He is mainly interested in the study of geomorphic processes in arid and semi-arid environments. His studies cover the three prevailing landscapes in dry-land areas: rocky areas; sandy areas and loess covered areas. In 1972 he established the long-term Sede Boqer Research Station, characteristic of an arid rocky area. In 1999 he established (in the frame of the Minerva Organization) the Arid Ecosystems Research Centre, in the Nizzana area. This site represents a sandy ecosystem. The studies were conducted along a rainfall gradient from 90-450 average annual rainfall, focusing on the hydrology and ecology of the various sandy areas. Finally, the studies of the loess covered areas, focused on the hydrological and pedological aspects, in an area with 280 mm average annual rainfall.

He received the following awards

2002: MEMBRE D' HONNEUR, SOCIETE DE GEOGRAPHIE, FRANCE

2003: FAROUK EL BAZ AWARD: QUATERNARY GEOLOGY AND GEOMOPHOLOGY DIVISION; GEOLOGICAL SOCIETY OF AMERICA

2012: CATENA: CERTIFICATE OF EXCERLLERNCE IN REVIEWING

2022. OXFORD INTENATIONAL RESEARCH AWARD FOR OUTSTANDING RESEARCH IN EARTH SCIENCES

Understanding and Predicting Global and Regional Climate Changes

Venkatachalam "Ram" Ramaswamy

Geophysical Fluid Dynamics Laboratory/NOAA, Princeton University, USA

Abstract:

Earth's climate over the past century has been affected by a variety of factors. These comprise (a) internal variability in the coupled atmosphere-ocean-land-ice system caused by nonlinear interactions in the processes governing climate, (b) natural forcings caused by changes in solar irradiance, the presence of aerosols in the stratosphere following volcanic eruptions, atmospheric entrainment of dust aerosols, and (c) human-influenced factors which include emissions of greenhouse gases (carbon dioxide, methane, nitrous oxide, halocarbons) and aerosols (sulfate, nitrate, black carbon, organics), and land-use and land-cover changes. Using the NOAA/ GFDL peer-reviewed climate models used in the Intergovernmental Panel on Climate Change (2013 and 2021), we diagnose the relative roles of the various factors in affecting climate from the global-to-regional-to-continental scales. Of principal importance: What has driven temperature and precipitation changes over the 20th Century? What is the projection for the 21st Century, globally and regionally? How will the hydrologic cycle, comprising evaporation of water from land and ocean surfaces, transport in the atmosphere, and precipitation change? What will be the climate-driven weather extremes under the action of forcings? We address these questions, underscoring the confidence in the estimates as well as the scientific uncertainties and unresolved challenges.

Biography:

"**Ram" Ramaswamy** is Director of NOAA's Geophysical Fluid Dynamics Laboratory, and Professor in the Atmospheric and Oceanic Sciences Program at Princeton University. His research interests are the mathematical modeling of the global climate system, investigating climate changes due to natural and human-influenced factors, and estimating the future projections of change. He directs one of the world's premier climate research centers, developing advanced numerical models to understand climate. Ram has published over 180 peer-reviewed papers and has been a lead author on key scientific assessments. He was a member of the Intergovernmental Panel on Climate Change team that was a co-recipient of the 2007 Nobel Peace Prize. He is also a recipient of the Rossby Medal (highest honor in Atmospheric Sciences from the American Meteorological Society), Charney Lecture (American Geophysical Union), and Distinguished Presidential Rank Award. He is an elected Fellow of the American Meteorological Society, American Geophysical Union, American Association for the Advancement of Science, and American Physical Society.

Groundwater as a Backup for Water Supply in the Era of Desalination.

Eilon M. Adar

Zuckerberg Inst. for Water Research, Ben Gurion University of the Negev, Israel

Abstract:

Food production is a synonym for water, and the increasing world population raises the demand for food and fresh water. Since most of the fertile areas in which conventional agriculture can be carried out are fully utilized, in the last few decades, marginal land in arid regions has begun to be cultivated with massive irrigation. The rapid growth of the world's population and increasing standard of living has led to an enormous settlement in desert areas; many are largely based on international tourism. The expansion of desert communities and the cultivation of arid land increased the water demand far beyond natural water replenishment. In the Middle East and the Arabian Peninsula, Saudi Arabia, United Arab Emirates, and Israel have overcome their water scarcity by reclaiming municipal effluents and desalinating seawater and brackish groundwater.

Saudi Arabia is the country that relies most on seawater desalination. Israel desalinates about 655 Mm3/y, about 60% of the total freshwater consumption. The agricultural sector consumes about 1.1 Bm3/y, of which about 68% is reclaimed water, 9% is brackish water, and only 23% is fresh water. The United Arab Emirates desalinates about 2.6 Bm3/y, more than twice as much water derived from natural sources such as groundwater and streams. The emirate of Abu Dhabi itself desalinates almost 1.5 Bm3/y, which amounts to about 30% of the total water consumption (February 14, 2022). In the USA, California will soon reach a desalination capacity of approximately 4.8 Bm3/y. Brackish groundwater and seawater are the only additional sources of water to utilize through desalination, and mega seawater desalination plants have been constructed to keep seawater production relatively affordable. The share of desalinated and reclaimed water will increase depending on population growth and the demand for additional municipal water and food production. Following the above, an increasing number of people rely on manufactured water with a limited backup storage capacity.

In the event of conventional local or regional malfunctioning of water sources, backup water supply often relies on prolonged natural operational reservoirs such as lakes or those created by damming the rivers. Such reservoirs are rarely feasible in arid regions with limited substantial rivers with significant discharge and high evaporation rates from open reservoirs. Properly managed aquifers may provide a long-term storage capacity for groundwater-based water supply systems. However, the annual groundwater recharge over arid basins is limited (at best) due to a scarcity of precipitation. Naturally, the operational storage capacity of desalination plants is limited and expensive.
On the other hand, a properly managed slow-recharged desert aquifer can provide a significant amount of water to overcome temporal water deficiency. While it can take years to rehabilitate or build a new desalination plant, preparing a stand-by groundwater abstraction system can temporarily bridge water deficiency and mitigate water shortage. In arid regions where the local aquifers contain salty groundwater, stand-by abstraction wells coupled with portable reverse osmosis desalination plants for brackish water can back up the water supply in the event of a prolonged malfunctioning of the regional desalination facilities.

For a local or regional aquifer to be used as an emergency water reservoir, the aquifers must be studied and characterized as a basis for planning and engineering the groundwater storage and the production well system. It is, therefore, essential to characterize the hydrogeology, the spatial variation of the water-bearing formations, the stratigraphy, the storage capacity, and the hydraulic connectivity to nearby bodies of water with variable salinity. Once the aquifer is thoroughly studied followed by an adequate management plan of the underground reservoir, and an array of groundwater production wells is established and maintained, it turns out that the aquifers constitute the best "water saving account" to back up desalination in arid regions.

Biography:

Eilon Adar is a Professor Emeritus (since 2018) at the Zuckerberg Institute for Water Research at the BIDR-Jacob Blaustein Institutes for Desert Research, Ben Gurion University in the Negev. Since 2019 he has served as the Chair of the Board of Directors at the Arava Institute for Environmental Studies. He is the founder and acting director (2001-2003) and Director (2004-2016) of Ben Gurion University's Zuckerberg Institute for Water Research. In recognition of his achievements in hydrology, he received the Alain Poher Chair in Hydrogeology and Arid Zones (2000-2018). Eilon Adar is a Member of the Water Technologies Advisory Board attached to Israel's Ministry of Industry and Commerce.

Adar's research, scientific and practical activities focus on Groundwater hydrology and modeling of groundwater fluxes in complex aquifer systems. His main research activities are allied with the quantitative assessment of groundwater flow systems and sources of recharge in complex arid basins with puzzling geology and scarce hydrological information. Adar developed the Mixing Cell Modeling (MCM) approach for complex hydrological systems, utilizing hydrochemistry and environmental isotopes in water coupled with a hydrological flow model. Beyond modeling groundwater flow patterns in the Arava, Jiezrael, Upper Jordan basins, and coastal aquifers in Israel, the model was applied worldwide in complex hydro-geological basins. Among them a quantitative assessment of groundwater flow pattern in the Sonora Desert (Arizona), Western Kalahari Desert (Namibia), Ili basin (Kazakhstan), Eastern Cape (South Africa), Mulde River (Germany), and recently in the Parita basin in Panama. Prof. Adar also dedicated his research to cross-border water resources in the Middle East and strengthening the R&D of water innovations within the industry.

Among the recent research activities are (1) Dynamics of flow and pollutant transport and the effect of industrial effluents on the hydraulic properties of a fractured chalk formation (Ramat Hovav Industrial Park, Israel). (2) Soil and groundwater contamination in the coastal aquifer of Israel by organic industrial pollutants. (3) Migration, dilution, and biochemical evolution of dissolved explosive substances in the multi-aquifers system. (4) Reevaluation of the groundwater flow pathways in the Nubian sandstone aquifer in Sinai and the Negev with hydrochemistry, environmental stable isotopes, and the calculation of groundwater age using radiocarbon and krypton isotopes [2018-2022]. (5) Hydro-geology and groundwater modeling in complex Parita aquifer basin in the "Dry-Arch" (Arch Seco), Panama [2017-2019]. (6) Assessing alternative freshwater resources for the Panama Canal [2017-2018]. (7) Spatial distribution of pollutants in the Panama City water supply system [2018-2019]. (8) Searching for deep fresh groundwater for developing modern agriculture in the Atacama Desert, Chile [2018], Exploring sources of lead among other heavy metals in domestic water supply systems, and the polluted groundwater-flow-trajectories in Georgia [2022]. For several months now, he has been a research partner with Prof.J. Fabrega at the Technical University of Panama (UTP) and facilitator of a groundwater quantification project in the Zarati basin, Panama.

Prof. Adar completed his undergraduate studies in Geography, Geology, and Climatology at Hebrew University in Jerusalem, Israel, in 1974 and earned his M.Sc. in Physical Geography and Hydrology from the same institution in 1979. Prof. Adar earned his Ph.D. from the University of Arizona, Tucson, in the USA, in 1984, with a Major in Hydrology and a Minor in Soil Water Engineering.

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Scientific Session-1

A Survey of Dam Infrastructure in Afghanistan

Alexander K. Stewart

Department of Geology, St. Lawrence University, Canton NY 13617 USA.

Abstract:

The unsuccessful withdrawal of coalition forces from Afghanistan in August of 2021 rapidly and considerably hindered Afghanistan's development environment. For over 20 years, the US-led coalition, partner nations and non-governmental agencies spent significant energies on the infrastructure of choice in developing nations—dams. These efforts were meant to kick-start development by providing a more stable water resource and electric-power generation; however, Afghanistan's ability to leverage such structures is lacking. Baseline data, moreover, on dam infrastructure in Afghanistan is rare and questionable. To provide independent authentication of available data, a three-tiered effort was employed to survey dams and diversions in Afghanistan: (1) Google-Internet search; (2) library research at the University of Nebraska's Arthur Paul Collection of Afghan materials (in English); and (3) satellite imagery analysis using either Google Earth/Maps or TerraServer.com. From this extensive survey, 62 existing dams spanning >9000 m of combined crest length, 109 major diversions totaling over 500 m in length diverting some 23% of affected river discharge and over 100 dams proposed by Afghanistan and partner nations were identified. Every province in Afghanistan is represented with Ghazni Province having the most existing dams (n=11), Paktia and Wardak provinces with the most proposed dams (n=9 each) and Kabul Province with the most diversions (n=23). Four main existing dams, Bandi Sultan, Dahla, Kajaki, and Salma Dams represent current large-dam infrastructure and associated problems. The proposed large dams, additionally, of Almar, Baghdara, Bakhshabad, and Kamal Khan are representative of the planned dam building in Afghanistan. In Afghanistan, all dams, existing or planned, are plagued with serious issues of maintenance, operation and/or funding; all are a part of the build-neglect-rebuild cycle that prevents any of these structures from providing as hoped.

Biography:

Dr. Stewart received his PhD in geology from the University of Cincinnati (Ohio, USA). He is a surficial geologist who works with students on a variety of projects, such as: using trees to unlock landscape change in Alaska, USA, leaf-wax work in the Adirondack Mountains, USA, evaluation of GIS imagery options for data collection, X-Ray diffractometry of glacier-lake sediments in the High Andes, Peru and the impact of geomorphology on the Battle of Sackets Harbor (1813), USA. Dr. Stewart also works on the inclusion of geological-reasoning training with the military and continues working on water-resource management in Afghanistan. In addition, Dr. Stewart is an avid scorpion biologist researching their behavior and has recently co-authored six new scorpion species from Central Asia.

Role of Ambient Noise Measurements and Multichannel Simulations of Seismic Waves in Understanding the Near Surface Material Properties for Seismic Site Characterization of Urban Centers

Ambrish Kumar Mahajan

Central University of Himachal Pradesh, Dharamshala, District Kangra Himachal Pradesh-176215, India

Abstract:

The Himalaya region is one of the active seismic belts and has suffered devastating effects from various earthquakes in the past like the 1905 Kangra earthquake (Ms 7.8), 1934 Bihar Earthquake (Ms 8.2) 1988 Bihar-Nepal Earthquake (Ms 8.1), 1950 Assam earthquake (Ms 8.1), 2005 Kashmir earthquake (Ms 7.6) and recently 2015 Nepal earthquake (Ms 7.6) These earthquakes have reflected the effect of site amplification on a high-rise building. Thus estimating the thickness of overburden above engineering bedrock is important for site amplification studies to increase the resilience of the built environment. The Himalayan region is marked by the presence of hills and small valleys with fan sediments, thus conducting geotechnical for site characterization at each site is not feasible. However, collecting information on near-surface material properties is an important factor to understand site effect. The present study is to understand the potential of ambient noise measurements and joint-fit-inversion modelling in a geologically complex region to deduce a one-dimensional (1-D) shear wave velocity profile. In this context, ambient noise measurements were performed using the Horizontal Vertical Spectral Ratio (HVSR) technique from several sites from different cities of the Himalaya region in combination with Multichannel Simulation with One Receiver (MSOR) measurements to derive 1-D shear wave velocity profile of each site. Based on the analysis, the resonance frequency and thickness of sediment have been determined for each site. The method also helped to derive a new empirical relationship between fundamental frequency and experimental pseudo-depth for the Kangra region using non-linear regression analysis, i.e., H (MSOR) = 183.13 f0-1.542 (H is first order pseudo-depth, f0 is fundamental frequency) to estimate the thickness of those sites where conducting seismic reflection along linear profile was not possible due to space constraints in Urban centers of frontal Himalayan and validate the results derived from experimental data.

Biography:

Prof Ambrish Kumar Mahajan obtained his BSc (Geology) from the H.P. University Shimla and his PhD (Geology) from the Panjab University Chandigarh. He is previously worked for the Wadia Institute of Himalayan Geology for 28 years. His PhD research was based on the Seismotectonics of Dharamshala-Palampur region in relation to Neo-tectonics for understanding the seismic migration behavior and hazard level of the region. He has established a methodology on seismic microzonation using multichannel analysis of surface waves and derived the response analysis for number of cities like Delhi, Jammu, Dehradun and Dharamshala. He further extended his research to develop a methodology to use ambient noise coupled with multiple simulations with one receiver to derive 1-D shear wave velocity profile of top 30m soil column. He currently is working as Dean and professor in the department of Environmental Sciences. He has published various papers in peer reviewed journals.

Spatio-Temporal Monitoring of Landslide Based on Abnormal Vegetation Characteristics in Remote Sensing Images

Qing Guo

Aerospace Information Research Institute, Chinese Academy of Sciences, Beijing 100094, China

Abstract:

The monitoring of high-mountain landslides which are difficult to reach has always been difficult for landslide monitoring. Routine displacement monitoring methods are difficult to give play to their advantages or even carry out, but poor accessible high-mountain landslides are often very destructive. Due to the influence of landslide creep, the landslide will cause changes in surrounding environmental conditions, which will affect the growth status of the landslide overlying vegetation. In the process of field geological investigation, the existence of abnormal vegetation growth is also found. Considering the limitations of traditional monitoring methods, for high-mountain landslides with vegetation cover, we take optical remote sensing technology to monitor the vegetation change and indirectly monitor the development of landslide creep, which brings new ideas for landslide monitoring and provides technical support for landslide disaster perception early warning.

According to the interpretation of optical remote sensing images and geological data, the study area is divided into sub-areas. The vegetation coverage in each sub-area is calculated using the time-series images and the pseudocolor enhancement is performed. Finally, the abnormal vegetation characteristics in remote sensing images from the spatio-temporal dimension is identified and analyzed, which is used to monitor the spatial and temporal changes of landslide.

Moreover, different monitoring methods are from different angles of the monitoring, and each has its own advantages and disadvantages, which is not comprehensive enough. Landslide itself is a complex process of interdisciplinary multi-factor interaction. Hence, we use multi-source time-series data from multiple factors to comprehensively give more detailed landslide spatiotemporal monitoring results, combined with the vegetation abnormal information of optical remote sensing, the surface deformation information of radar remote sensing, and the multifactor landslide sensitivity information. The case analysis results of the Jizong Shed-Tunnel landslide in Sichuan-Tibet lifeline and the Temi landslide along Jinsha River prove the reliability and effectiveness of our research ideas.

Biography:

Dr. Qing Guo (Member, IEEE) received the M.Sc. And Ph.D. degrees in optics from the Harbin Institute of Technology, Harbin, China, in 2006 and 2010, respectively. From 2007 to 2009, she was an exchange Ph.D. Student with the Department of Electrical and Computer Engineering, University of Calgary, Calgary, AB, Canada. She joined the Chinese Academy of Sciences, Beijing, China, in 2010, where she is currently a Full Professor with the Aerospace Information Research Institute. From 2014 to 2015, she was a Visiting Scholar with the Institute for Geoinformatics and Remote Sensing, University of Osnabrück, Osnabrück, Germany. Her research interests focus on remote sensing information extraction and processing, including image fusion, cloud detection, deep learning, and landslide monitoring. She has published more than 80 papers in peer reviewed journals, including 48 SCI papers.

Seismic Resilience Assessment of Buildings: A Simplified Methodological Approach through Conventional Seismic Risk Assessment

Hector Aroquipa

Researcher from Instituto de Investigación Científica, Universidad de Lima, Av. Javier Prado Este 4600, Santiago de Surco, & Universidad Nacional Federico Villarreal, Peru

Alvaro Hurtado

Researcher from Instituto de Investigación Científica, Universidad de Lima, Av. Javier Prado Este 4600, Santiago de Surco, 15023, Peru.

Abstract:

A simplified methodology to evaluate seismic resilience of buildings through a probabilistic risk assessment is proposed. The methodology uses the results from the conventional seismic risk assessment with the inclusion of social and economic aspects. The seismic resilience assessment process considers the workforce population, repair time, direct and indirect losses. They can be applied within the damage definition stage with the aim of the vulnerability functions for a specific building typology, and loss estimation stage of the probabilistic risk assessment. For the case of the definition of vulnerability functions a previous methodological approach is used with fewer modifications. In addition, a new risk figure called average annual repair time is introduced in the probabilistic risk assessment allowing to obtain the resilience index. Aspects such as expected repair time, quantities of crew members, business interruption losses, workforce population capacity and risk figures: average annual loss, probable maximum loss and average annual repair time are considered. Then, all those aspects are integrated within the exposure, damage, and loss estimation models with additional considerations to perform the calculation of the resilience. Finally, the results are represented by means of a unitless simplified resilience index allowing to be compared among different scenarios. The methodology is illustrated using two study cases. The first one represented its application at damage definition stage and is comprised by 3-, 6- and 9-story reinforced concrete moment resisting frame school buildings designed for special seismic code level. The second one covered the application at loss estimation stage and considers a fictitious portfolio of approximately 190,000 buildings composed by the previous three building typologies located along the whole country of Peru. The results show a highly sensitivity associated to workforce population, repair time, and indirect losses. Conclusions and possible applications related to Disaster Risk Reduction are summarized.

Biography:

Dr. Hector Aroquipa obtained his BSc (Civil Engineering) from the Universidad Nacional del Altiplano, his M. Sc. from the University of Los Andes Bogota, Colombia (Civil Engineering, study emphasis: Structural, seismic and materials engineering), and his PhD (Civil Engineering) from the Universidad Nacional Federico Villareal, Peru. He is previously worked as professor for graduate and undergraduate courses at several universities in Peru. His PhD research was based on the seismic resilience assessment of buildings from seismic events through risk metrics AAL and PML. He currently lectures project management at the Universidad Nacional Federico Villareal and San Antonio Del Abad and participate as researcher at the “Grupo de Investigación en Métodos Numéricos y Computacionales” from Universidad de Lima, Peru. His area of interest is seismic resilience and vulnerability assessment of buildings, Structural and Earthquake Engineering. He has published various papers in peer reviewed journals, and he has participated in international congress.

Alvaro Hurtado is currently an independent consultant for numerous private companies and participate as researcher at the “Grupo de Investigación en Métodos Numéricos y Computacionales” at Universidad de Lima, Peru. He obtained his BSc (Civil Engineering) from the University of Los Andes, Bogota Colombia, and his MSc (Civil Engineering, study emphasis: Structural, seismic and materials engineering) from the same university. He has an overall 10 years of experience in industry, academy, and research. He has been involved with software development for vulnerability assessment at CAPRA platform. His academy experienced has been related to teaching assistant for graduate level courses. His main areas of expertise are structural and earthquake engineering, vulnerability assessment for buildings and specialized software development for vulnerability and risk assessment. He has published various papers in peer reviewed journals

Aassessing Hydraulic Connectivity, Transmissivity, and Quantifying Groundwater Fluxes in Complex Arid Basins by a Mixing Cells Modeling Approach

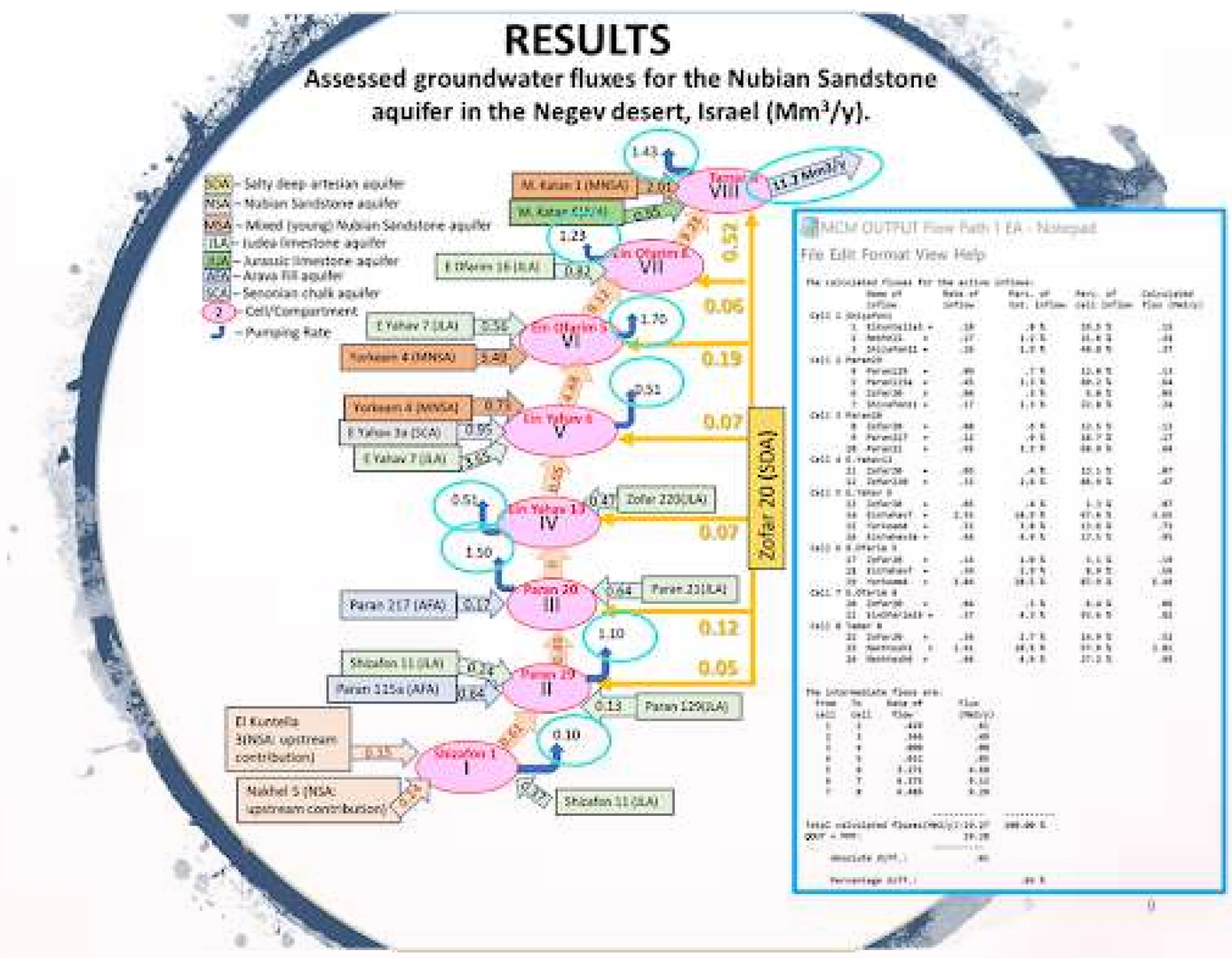
Eilon M. Adar

Zuckerberg Inst. for Water Research, Ben Gurion University of the Negev, Israel

Abstract:

Many hydrogeological basins lack basic hydrological information to assess the potential of groundwater production. Following the lack of hydrological information in complex aquifers, the boundaries and the hydrological conditions along the boundaries are not well defined or distinct. Thus it is impossible to construct, solve, and calibrate a groundwater flow model based on the continuity approach. A Mixing Cells Modeling (MCM) approach has been developed to determine steady and transient groundwater fluxes in complex aquifer systems with vague hydrological information. It aims to identify and quantify sources of recharge and hidden sources of contaminants percolating into groundwater reservoirs. It allows the assessment of groundwater fluxes in a complex, transient hydrological system where the spatial distribution of dissolved minerals and pollutants varies with time. The proposed alternative MCM algorithm is based on a more simplistic yet practical approach, in which the flow domain is sub-divided into pseudo-homogeneous flow cells forming a multi-compartmental (rather continuum) flow model. The construction of the multi-compartmental structure is based on the spatial distribution of dissolved minerals, environmental isotopes, and pollutants in a steady or transient hydrological system. A set of water and mass balance expressions of dissolved minerals for every cell (compartment) forms the linear or quadratic objective function for a transient or steady flow, respectively. The MCM flow model is solved by an optimization scheme with the mass balance of the dissolved minerals as linear constraints.

This presentation demonstrates the mathematical algorithms of the MCMsf (steady flow) and MCMusf (unsteady flow) for identifying and quantifying groundwater fluxes and recharge into complex aquifer systems and assessing the transmissivities over a complex aquifer.



Biography:

Prof. Eilon Adar investigates aspects of worldwide arid zones hydrology. His main research activities focus on a quantitative assessment of groundwater flow systems and recharge in complex arid basins with puzzling hydrogeology and scarce hydrological information. He developed the Mixing Cell Modeling approach in hydrology used in numerous basins worldwide. He is also dedicated to cross-border water issues in the Middle East. Prof. Adar completed his undergraduate studies in Physical Geography, Geology, and Climatology at Hebrew University in Jerusalem, Israel, in 1974 and received his M.Sc. in Physical Geography and Hydrology from the same institution in 1979. Prof. Adar earned his Ph.D. from the University of Arizona, Tucson, in the USA, in 1984, with a Major in Hydrology and a Minor in Soil Water Engineering.

A Statistical Analysis to Estimate the Average Rig Time and Easiness of Drilling in the Indian Sedimentary Basins

Dr. Surajit Gorain

Directorate General of Hydrocarbons under the Ministry of Petroleum and Natural Gas, India

Abstract:

Exploration of hydrocarbons is a complex and cost-intensive venture. Out of all the exploration activities, the drilling activity incurs the maximum cost. As the per-day cost of a drilling rig has the highest impact on the cost estimation of drilling a well, predicting the rig days before drilling is the utmost important task for the geo-scientist. An attempt has been made to create a template to estimate the average rig days in the Indian sedimentary basins so that the investors can make an informed decision before making drilling commitments while bidding for an exploration acreage under Open Acreage Licensing Policy (OALP) and later when under-taking exploration activities in the awarded block/acreage. More than 16k wells across the sedimentary basins of India are used in this analysis. Although the physics and chemistry of drilling are well known, the uncertainties lie in the local geologic conditions, well specifications, contractor's experience, timely availability of drilling rigs and equipment, other market-related and local administrations. Filtering out the exceptionally low and very high rig time, related to the above factors, an average rig time (ART) and average total depth (ATD) for each basin has been calculated using the simple averaging principle. ART is plotted basin-wise in form of a bubble map, which provides a comprehensive idea of how much time is required to reach the total depth basin-wise. It may help in the estimation of the drilling cost of any future well in relatively new areas. In addition, a contour map is also prepared including the basin-wise ATD, which provides an idea about the structural variation of the ATD or broadly the basement configuration of the basin. In conjunction with ART, ATD for each basin is also incorporated into the bubble map, so through this map, a synopsis of the whole drilling environment can be assessed very easily. To highlight the variations related to the geological aspects these two contributing factors i.e. ART and ATD are combined, and a single factor i.e. easiness of drilling (EOD) is calculated and plotted in another bubble map through the Indian sedimentary basins. This map helps the investors in their decision-making process by providing information on how far and how long to drill basin-wise, before venturing into any project.

Biography:

Dr. Surajit Gorain, is a dedicated results-driven innovative geophysicist, with over 15 years of industry experience in the oil and gas sector. Presently working as Chief Manager-Geophysics in the Directorate General of Hydrocarbons (DGH) in National Data Repository (NDR) department. He received his Ph.D. degree in Reservoir Characterization in 2015 from the Indian School of Mines (ISM), Dhanbad. He has more than fifteen international publications till now. His core competencies are structural framework interpretation (horizons and faults), Seismic facies and attribute analysis, Reservoir modeling (static modeling), Resource/Reserve estimation, Reservoir characterization based on Attribute-Based Inversion, Prospect evaluation, uncertainty, and risk analysis.

Geophysical Exploration Applied to Artificial Aquifers and Geothermal

Sonia Santos-Assuncao

Geophysical Consultant, UAE

Abstract:

This case study presents the application of geophysical methods including both electrical resistivity tomography and vertical electrical sounding to artificial aquifers and geothermal. Artificial aquifers might be extremely useful to naturally store desalinated water and to cover periods of water scarcity. Both techniques are compared and the electrical resistivity is presented in different geological backgrounds, including metamorphosed and volcanic sedimentary rocks, tertiary faulting combined with sedimentary covering and igneous rocks. The sources are from United Arab Emirates, Spain and Portugal. Here is shown the potential of the techniques to map enormous cavities that be used as artificial aquifers or even to locate ascension the geothermal springs. 3D models can be developed based on this technique to quantify the volume and extension of the anomalies.

Biography:

Dr. Sonia Santos-Assunçao was born in Oporto, Portugal, in 1987. She received the B.S. degree in geophysics from the University of Aveiro, Aveiro, Portugal, and the Aristotle University of Thessaloniki, Thessaloniki, Greece, in 2009. After, she completed her M.S. degree in geophysics from the University of Barcelona, Barcelona, Spain, in 2010, and the Ph.D. degree in study and development of GPR applications in seismic zonation from the Polytechnic University of Catalonia, Barcelona, Spain, in 2014. She worked in 16 countries, in different companies and universities, including Europe, Africa, Middle East, Asia and South America. She also joined the European COST Action TU1208 (Civil Engineering Applications of Ground Penetrating Radar).

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Scientific Session-2

Ore-Bearing Quartz-Sericite and Apatite-Albite Metasomatites (Aceites) of the Eastern Aldan-Stanovoy Shield

Kirillov V.Ye

Institute of Tectonics and Geophysics ITIG, Khabarovsk, Russian Federation

Abstract:

Quartz-sericite and apatite-albite metasomatites (aceites) of the Middle Riphean age (1250-1190 Ma) were identified within the eastern part of the Aldan-Stanovoy Shield.

Quartz-sericite metasomatites are associated with deposits and ore occurrences of uranium, vanadium, molybdenum, tantalum and niobium in volcanics of Ulkan eoplatform basins and terrigenous rocks of platform basins. The position of metasomatites is controlled by steeply dipping faults and unconformity zones AR-PR1, AR-PR2. Quartz-sericite metasomatites compose vein-like and sheet-like bodies along the unconformity and gentle boundaries of layer. Ore mineralization is associated with quartz-hydrosericite facies.

Apatite–albite metasomatites are associated with the formation of deposits and ore occurrences of uranium and rare earths in various geological settings (in Archean metamorphic rocks, and Early Proterozoic volcanic and intrusive rocks). The peculiarity of aceitization is, on the one hand, the contrast ratio of ore bodies, on the other, high productivity mineralization in each case of metasomatosis. In all cases, aceites compose vein-like and lenticular, less often sheet-like (in gneiss) ore bodies. Aceites in the rocks of the crystalline basement are characterized by an albite-chlorite-apatite association (facies) of minerals, in igneous rocks (granites and trachyrhyolites) – albite-apatite-hematite facies.

The genetic relationship of quartz-sericite and aceites with igneous rocks has not been established. It is possible that they belong to the tectonogenic class of metasomatites that appeared in local hydrothermal systems after tectonic activity.

Biography:

Kirillov V.E. was born on 18.01.1956 in Tomsk, Russia. In 1978 he graduated from Tomsk State University with a degree in Geomorphology and Geology. From 1978 to 2020 he worked at various geological enterprises in Khabarovsk, in 2004-2008 at the Institute of Tectonics and Geophysics (ITiG). In 1991 he defended his PhD thesis on the topic "Ore-bearing alterations in volcanites of the Ulkan basin". Since 2020 and up to the present, he has been working at ITiG as Senior researcher employee. Kirillov V.E. is a specialist in the field of metallogeny of rare earths and rare metals, gold and silver. Published 65 scientific articles, 2 scientific monographs. He is the Chairman of the Far Eastern Branch of the Russian Mineralogical Society.

Mineralisation of CO2 in Construction Products

Colin Hills

University of Greenwich, Chatham Maritime, Kent ME4 4TB, UK

Abstract:

Solutions for the management of anthropogenic CO2 emissions are being rapidly developed resulting from 'Net Zero' initiatives and a price being applied to emissions to atmosphere. The capture and utilisation of CO2 in consumer products is as diverse as polyurethane foams, jet fuel (kerosene) and in 'mineralised' construction products.

The present work involves the production of manufactured carbonated aggregates which provide an alternative to virgin stone in construction applications. In the UK, manufactured carbonated aggregates have been available for more than a decade. Industrial process wastes such as air pollution control residues (APCr) are used as the substrate for CO2 mineralisation, thereby providing an alternative management strategy to landfill via value addition.

Aggregate products meet the regulatory 'end of waste' 'test', are lighter in weight than conventional aggregates and conform to the relevant British Standard. Current UK production is IRO of 400kt/pa, with the aggregate products largely being used in concrete block production. More recently, mobile plant has been developed and commercially deployed enabling industrial gaseous and solid wastes to be 're-combined' at the sites of smaller and medium-scale industrial emitters.

The focus of the work is to overview the development of mineralised CO2-based aggregates using a thin-film carbonation approach analogous to nature. The industrial process residues that can be used in their production, and the role that mineralisation technologies can play in permanently sequestrating CO2 in the built environment are discussed.

Biography:

Professor CD Hills is geologist and environmental engineer, and Professor of Materials and Environment Engineering. He has an extensive research record on the stabilisation/solidification of waste and soil using hydraulic and carbonate-based systems. He has authored national guidance for the Environment Agency (England and Wales) and was lead co-ordinating author (Climate Change) for the UNEP Global Environment Outlook, GEO 6 (Pan-Europe Assessment). Example board memberships include CO2Chem, ISCOWA, carbon8 and SCOT (now CO2Value Europe).

His work has been recognised with key awards, including: The Green Chemical Technology Prize (IChemE) and the Times Higher Award for his Outstanding Contribution to Innovation and Technology. Professor Hills' innovative research has been commercialised for the manufacture of carbonated aggregates from solid waste and CO2 gas. This achievement received the Queens Award for Enterprise: Innovation in 2017.

Transforming Biomass Waste into Carbonated Aggregate

Nimisha Tripathi

University of Greenwich, Chatham Maritime, Kent ME4 4TB UK

Abstract:

Biomass wastes are produced each year in Giga-tonne quantities. These wastes arise from agricultural, forestry and other activities and are often left to 'rot' in fields. Uses of biomass waste include domestic heating, as fertiliser and as a source of energy production. With the increase of biomass to energy production as a replacement for the combustion of coal, solid residues in the form of ash are being generated in increasing quantities, which are primarily being disposed of in landfill.

As an alternative to disposing biomass ash to landfill, these ashes can be simply further processed to retrieve their mineral content, some of which tends to be very reactive with CO2 gas in a managed reaction. The mineral component can be used as a carbonate-able cement in which CO2 is mineralised itself to carbonate, and as a binder for other materials including waste biomass itself. Further, the carbonated ash-derived minerals have potential as a partial replacement for Portland cement.

The present work discusses the concept of using a processed biomass ash product for the manufacture of a carbonate-able binder and its laboratory application in the manufacture of light-weight construction products. A circular thermal process is proposed in which some of the CO2 emitted is re-combined with the mineral contents to make aggregates or other products for use in construction applications. Further, direct and indirect CO2 offsets and estimates of the amount of construction products that can be manufactured in the way described are given.

Biography:

Dr Nimisha Tripathi is an Environmental Scientist with a research track record spanning 20 years. She holds two master's degrees (Botany and Environmental Science) and has a PhD in Environmental Science. Nimisha's research interests cover contaminated land remediation, restoration ecology and waste valorisation. She has >90 publications, including in Nature Group journals and Faraday Discussions. Nimisha authored 'Reclamation of Mine Impacted Land for Ecosystem Recovery' (Wiley pubs., UK) and the Pan-European Assessment of the UNEP GEO6 (waste electronic and electrical equipment/chemicals and wastes).

Dr Tripathi has received several national and international awards, including Young Scientist Award, Govt. of India and Endeavour Research Award, Govt. of Australia. She is a founder of the Indo:UK Centre for Environment Research and Innovation (IU:CERI), a joint University of Greenwich, UK and the CSIR-CIMFR, India collaboration.

Direct and Indirect Plant-Soil Interactions in a Semi-Arid Shrubland

Manuel Navarro-Perea

Instituto Pirenaico de Ecología, Spain

Abstract:

Plant soil feedbacks is an important aspect for ecosystem dynamics in many regions of the worlds. They can regulate important processes such as nutrient cycling, decomposition rates or carbon fixation. In Mediterranean regions, plant-soil feedbacks have been poorly understood. In this study, we propose a plant-soil interaction model where several traits of vegetation and attributes of soil are interconnected in order to explain processes such as nitrogen cycling and microbial growth. We measured plant biomass and quality of plant tissue as plant traits, and nitrogen, microbial biomass, water infiltration capacity and compaction as soil attributes. We employed a structural equation modeling analysis to relate these traits in a logic way through a network analysis. We were interested to compare relative influence of vegetation and microorganisms on biological and hydro-physical soil attributes. Results showed that nitrogen content was fundamentally affected by plant biomass, and was a main driver microbial biomass; by contrast, water infiltration capacity was the main attribute affecting plant biomass. Quality of vegetal tissue was the other important driver affecting microbial biomass. We evidenced a plant-soil interaction network mediated by plant biomass and microbial biomass, where both biological and physical attributes acted as co-forces in interaction plant-soil dynamics. Results can be valuable to manage areas of this type, to address its conservation and restoration.

Biography:

Manuel Navarro Perea is a Ph. D researcher at Pyrenean Institute of Ecology, Spain. He is working with the department of Biodiversity and Restoration and Ecosystem Conservation.

The Origin of the Punta Stilo Swell (Central Mediterranean): The Result of the Calabrian Accretionary Complex dynamics

Giacomo Mangano

University of Calabria – Department of Environmental Engineering – 87036 Arcavacata di Rende (CS), Italy

Abstract:

This study provides a better understanding of the evolution of a submerged prominent morphological high (here referred as Punta Stilo Swell – PSS) in the Calabrian Accretionary Complex (central Mediterranean), which is ca. 50 km long, 35 km wide and elevates up to 1500 m from the basin floor. The genesis of the PSS is closely related to the Calabrian Accretionary Complex kinematics since the Middle Miocene onwards, which consists of an alternation between phases of SE forward migration, linked to conditions of basin subsidence, and temporary stopping or slowdown of the complex, that resulted in the generation of uplift and unconformities. The integration of high-resolution multi-beam echo-sounder and 2D seismic reflection profiles, calibrated with wells logs, have revealed that the area is the result of events of contractional, extensional and transtensional tectonics since the Middle Miocene onwards. In particular, the PSS experienced a phase of contractional tectonics during the Messinian that likely produced the reactivation of inherited structures and resulted in the very steep (> 10°) modern continental slope along the southern and eastern sides of the area. This was followed by events of extensional and transtensional tectonics in the Early Pliocene and in the Late Pliocene/Pleistocene that drove the development of the present-day morphology along the shelf-break as well as along the northern boundary of the PSS. The very steep modern morphology of the area let the site prone to the onset of geohazard-related geomorphic features, expressed in the form of canyon headwalls and slide scars, and for this reason the area deserves regular monitoring for the safety of coastal communities and infrastructure.

Biography:

Dr. Giacomo Mangano obtained his MSc (Geology) from the University of Padua and his PhD (Geosciences) from the University of Calabria (in collaboration with OGS – National Institute of Oceanography and Applied Geophysics). His PhD research was focused on possible relationships between the tectono-stratigraphic evolution of the Crotone Basin (central Mediterranean) and the generation of geohazard-related geomorphic features at various scale. This project also provided a better understanding of the hydrocarbon generation and trapping of the basin. Dr. Giacomo Mangano is expert in the analyses of 2D/3D seismic reflection, multi-beam data and well logs by the use of Petrel, PetroMod, IHS Kingdom, and Global Mapper. His area of interest is the impact of sedimentary basin evolution on geohazard-related geomorphic features and fluid flow migration and accumulation.

Reservoir Geomechanics for Naturally Fractured Reservoir

Monzurul Alam

Senior Geomechanics Engineer, Schlumberger, United Kingdom

Abstract:

Hydrocarbon production from naturally fractured reservoirs requires accurate mapping of the fracture network and their properties. Fracture modeling is one of the most complex aspects in geosciences and needs integration of multiple domains and many kinds of data. In this paper, the different application of natural fractures is reviewed from the geomechanics point of view. From production perspective it is important to identify sweet-spot (high conductive fractures) targets for field development planning. The 3D distribution of stress and pore pressure together with the mechanical properties and natural fracture model can be used to create Completion Quality (CQ) cubes. These are 3D volumes representing geomechanical indicators of potential success of production from a fractured reservoir. While drilling through fractured zones, as well as producing from fractured zones, it is crucial to assess the stability of the wells. Drilling risk in such reservoirs can be reduced significantly by application of geomechanics. Geomechanics also plays a key role in understanding the generation of fractures as well as the evolution of fractures with geological time. Geomechanical forward modeling (GFM) is a comprehensive workflow which incorporates compaction of sediments with time as well as effects of regional tectonics for prediction of natural fractures. Several examples of GFM driven fracture models and their application on improved production from fractured reservoir will be presented.

Biography:

Dr. Alam obtained his BSc (Mechanical Engineering) from the Rajshahi University of Engineering and Technology (Bangladesh) and his MSc (Petroleum Engineering) and PhD (Rock-physics) from the Technical University of Denmark (DTU). He currently works as a senior reservoir geomechanics engineer at the Schlumberger Reservoir Geomechanics Center of Excellence in the United Kingdom. He possesses seven years work experience in geomechanics and petrophysical laboratory. In his early career as a mechanical engineer, he worked a maintenance engineer in textile factory for 3 years. His current responsibilities include numerical simulation of reservoir stress, natural fracture modelling, wellbore stability analysis. He participated in several collaboration projects between industry and academia.

Global Warming and its Effect on Earth System in North Bihar (India)

Shahnaz Jamil

Prof. & Head, University Department of Botany, L.N.M.U Darbhanga, India

Abstract:

The most significant global environmental problem faced by the world community is related to global environmental changes (GEC) resulting from global warming. This warming is caused by a host of casual factors, mainly anthropogenic factors such as changes in atmospheric chemistry, ozone depletion, and emission of greenhouse gases at an alarming increasing rate. The probable net result of global warming and changes in atmospheric chemistry through air pollution and other natural sources would be climate change at the local, regional, and global level. Climate change can severely affect human society, agriculture, and natural ecosystems. Many wild plant and animal species found today may be forced out of their habitats as the climate warms. Melting glaciers and heavy storm damage could severely affect coastlines. Infectious diseases would become more common due to the global imperative. The net result of all these factors is a change in the climatic condition from the local through the regional to the global level. The long-term challenge of stabilizing the atmospheric condition of the greenhouse effect requires significant lowering of global emissions from their current levels. If we do not act now, climate change will rapidly alter the ponds and water we all depend upon. The effects of global warming are already bringing threats to human communities and the natural world. Further temperature rises will have a devastating impact, and more action on greenhouse gas emissions is urgently required.

Biography:

Dr. Shahnaz Jamil is a highly experienced academic with 38 years of teaching experience at Lalit Narayan Mithila University in Darbhanga, Bihar, India. She earned her M.Sc in Botany and PhD in Microbiology from the same university. Dr. Jamil has published 15 papers in peer-reviewed journals and has participated in numerous national and international conferences. She held the position of Head of the University Department of Botany and has contributed to the growth and development of the department. Dr. Jamil is committed to advancing knowledge and promoting learning in her field, and her extensive experience and contributions have earned her a reputation as a respected academic and an expert in Botany and Microbiology and Environment.

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Posters

Cretaceous Subsurface Magmatic Manifestations of the Eastern Tunisia in its Mediterranean Context: New Petrological, Mineralogical and Geochemical Data.

Matoussi Kort Hanene

Mineral Resources, Geosciences, Energy and Environmental Laboratory (L.G.R.M.E.E.), Campus University Farhat Hachad, University of Tunis El Manar, Faculty of Sciences, Tunis, Tunisia

Abstract:

In this study the tectonic history of the area combined to the new petrological, mineralogical and geochemical investigations of subsurface will contribute significantly to place this magmatism in its Mediterranean context. Tectonic models are proposed to explain the geodynamic and the tecto-magmatic history of the studied area during Cretaceous. Crustal thinning concord with the rifting and the extensional tectonic event that affected this area. The magmatic occurrences and repartition are directly linked to deep rooted faults that enabled magma ascent. These magmatic manifestations were made during four magmatic events. During these events, the products are mainly interbedded basalts, numerous mafic sills and dykes, volcanic breccias and pyroclastic products. Electronic microprobe studies of clinopyroxene prove an anorogenic context of this magmatism. We used variable distribution of incompatible trace element ratios, such as Th/Ta, Th/Tb, or Th/Hf. These elements are characterized by distinct mantle composition source and different partial melting trends. These data suggest that the magma of tholeiitic affinity basalt is originated within the enriched mantle (EM1), moderate impoverishment in light rare-earth elements (LREE). The mantle source of alkali basalt is compositionally transitional between the high-U/Pb mantle (HIMU) and enriched mantle (EM2).

Biography:

Dr. Matoussi Kort Hanene obtained her PhD (Geology) from the University of Tunis, Faculty of Sciences of Tunis. She is Professor Assistant of igneous petrology and mineralogy in the Faculty of Sciences on Tunis at University of Tunisia, she is a researcher at the Laboratory (L.G.R.M.E.E.), FST-Tunis. She is a member in the international association for the conservation of geological heritage (ProGEO). Her PhD research was based on the study of subsurface Cretaceous magmatism and enclosing sedimentary pile in Eastern Tunisia and the Pelagic Sea. She is also interested in the study of submarine hydrothermal alteration and the impact of this alteration on the petroleum system. She is also interested in geoheritage in Tunisia and in the world and aims to establish strategies for the development of national and international geotourism in a framework of sustainability. Her area of interest is igneous rocks, geodynamic implications, hydrothermalism, petroleum system, geothermal energy, Clay minerals and Geoheritage. She has published various papers in peer reviewed journals.

Facies Based Permeability Prediction and Reservoir Characterization Using Nuclear Magnetic Resonance Log in Mesozoic Formation - A Case Study from Kutch Offshore Basin, India

G.D.D.Jyotsna

CEWELL, ONGC, India

Abstract:

Mesozoic sandstone gas reservoirs of Kutch Offshore basin are tight and can be termed as unconventional reservoirs, having permeability is generally less than 0.1 mD. Such reservoirs have low producibility, and they can only be exploited under technically viable economic conditions. Due to the influence of factors such as sedimentation, accumulation, and reservoir physical properties, the salinity of formation water is varied. In addition, the reservoir is prone to stress-sensitive effects, which results in decline of reservoir. Therefore, it is necessary to study permeability in such tight sandstone gas reservoirs. This study presents a comprehensive understanding of porosity and permeability system in lithologically complex Mesozoic formation in Kutch offshore basin. The petrophysial evaluation of hydrocarbon bearing sands has been quantitatively evaluated using lab derived petrophysical parameters. Due to finite set of core samples, permeability generated from Nuclear magnetic resonance log from key well has been used to estimate permeability for nearby well data. Electro log based facies prediction was used to derive modelled permeability which has been corroborated with testing data. In Kutch offshore basin, Mesozoic formation is deposited at a depth of approximately 2400-4000m beneath trap. Depositional environment, pore geometry & overburden of rocks pose limitation to the modelled permeability but a qualitative match is observed in normalized frequency charts which have been plotted against reservoir/sand layers.

Biography:

Mrs. GDD Jyotsna obtained her BSc (Computers) from Andhra University, Visakhapatnam, India and Post Graduation studies M.Sc (Tech Geophysics) from Andhra University. She presently working for Oil and Natural Gas Corporation as Chief Geophysicist (Wells) and currently pursuing PhD in Petroleum Geophysics from Pandit Deendayal Energy University, Gandhinagar. She is having 15yrs experience in Petrophysical Data processing and Interpretation. She have published one international technical paper and four papers in national peer reviewed journals. Presently she have interest in carrying out research in Petrophysics using Artificial Intelligence and Data analytics.

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Day-02 (May 09, 2023)

Keynote session

Groundwater & Geohazards - Impacts of Groundwater Overexploitation on Occurrences of Land Subsidence and Sinkholes in Farmlands at Konya Karapinar Site, Central Anatolian Part of Turkey

Hatim Elhatip

Aksaray University, Faculty of Engineering, Department of Environmental Engineering, Aksaray 68100, Turkiye.

Abstract:

Groundwater pumping is one among several serious causes capable to cause many serious problems in earth systems. The overpumping of large quantities of groundwater (e.g. for irrigation and water draining purposes) is very possible to produce ground subsidence, as the phenomenon which usually gets worse as groundwater pumping continues. The consequences of such phenomena may be dangerous, especially in the farmland when the ground subsidence becomes not smoothly distributed in the problematic area. The increase in the use of groundwater for agricultural and industrial expansion accompanied with successive droughts has greatly lowered the groundwater level in this area. This has resulted in farmland subsidence and increase sinkhole occurrence. The main target of this research is to evaluate the relationship between the high declination of groundwater level by overpumping in farmlands and occurrences of land subsidences and sinkhole collapses in different depths in Konya Karapınar plain site, at the Central Anatolian part of Turkey. In this paper, both hydrogeological, geotechnical and Geoelectric field studies were carried out in order to investigate the karstic structures and to identify a mechanism of formation of these structures, and finally, to explain the changes in the occurrence of these geological hazards and the main triggering factors, that play an important role in the development of land subsidence and sinkhole formation in these farmlands.

Biography:

Dr. Elhatip, has completed his MSc (1986) and PhD. (1992) on Hydrogeological Engineering from Hacettepe University in Ankaray. He has been working as Associated Profesor (field of Hydrogeological Engineering), in Hacettepe University Until 1998. He has continued his academic career in Aksaray University in Environmental Engineering Department, since 1999. He has more than 15 years of experience in the field of Environmental engineering, water resources research, water quality and Water Framework Directive. During his academic researches, he has been working and coordinating several national projects with different governmental and private sector institutions in the establishment of national reference conditions for rivers, lakes and reservoirs. He has been working in many national projects, carrying out hydrological and hydrogeological studies and researches including, estimation of aquifers characteristics, technical studies to determine environmental flow regimes in rivers (for many hydroelectric power plants) and estimation of hydrogeological and hydromorphological characteristics of lakes, water basins and water bodies in Turkey.

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Scientific Session

The Applications of The Aster Satellite Data for Shallow Water Exploration, Saudi Arabia

Abdullah O. Bamousa

Geology Department, Taibah University, Al Madinah Al Munawarah, Saudi Arabia

Abstract:

This study presents water resources exploration using the Advanced Space borne Thermal Emission and Reflection Radiometer (ASTER) satellite data in southern Saudi Arabia. Wadies networks cutting through hard crystalline rocks of the Precambrian Arabian Shield are known to be the main source of shallow groundwater. These wadies are filled with alluvial deposits and have law vegetated surfaces, therefore, reflected electromagnetic spectrum of visible bands images reveal them. The ASTER data includes: three visible and near infrared (VNIR), six shortwave infrared (SWIR), and five thermal infrared (TIR) bands that were used in this study. Thus to explore for shallow underground water of wadi deposits, the ASTER wide range of thermal bands were utilized in this study. Thermal bands are known to measure the absorbed heat of the different lithologies, hence reflecting the thermal conditions of dry/moist wadi deposits. The thermal condition of the wadi deposits surfaces might indicate water-bearing deposits that can be explored and exploited. Different false color composite imageries of ASTER data were produced to enhance the widespread drainage patterns of the region. Sites of shallow groundwater-bearing alluvial of the wadi deposits were indicated by depicting low values of thermal conditions. This study is performed on Wadi Bishah and Jizan areas, southern Saudi Arabia. In Wadi Bishah area false color composites of bands 10, 11, 13 set in Red, Green and Blue (RGB) filters shows clearly fracture system and law thermal conditions, filled with subsurface groundwater, compared to the visible true color composite image. In Jizan area, false color composite of bands 10, 12, 14 set in RGB shows the structurally controlled wadi paths below the sediments. Therefore, ASTER data has two advantages: it can be used for lineaments extraction, such as RADAR data, and has the advantage of being multispectral bands platform that can be used in exploration.

Biography:

Prof. Dr. Abdullah Bamousa obtained his BSc (Structural Geology and Remote Sensing) from the King Abdul-Aziz University of Saudi Arabia and his MS degree from South Dakota School of Mines and Technology, USA. His PhD (Geology) is from the University of Leicester, UK. He is previously worked for the United States Geological Survey, Jeddah mission, Saudi Arabia as geologist. His PhD research was based on the Structural Analysis and Tectonic significance of the Carmel Head Thrust Belt, North Wales. He currently lectures structural geology and geology of Saudi Arabia at the Taibah University of Al Madinah, Saudi Arabia. He is the Dept. Chairman of the Geology Dept. at Taibah University. He worked as part-time consultant for Saudi Geological Survey for more than 10 years. His area of interest is structural geology, geomorphology, image interpretation, remote sensing. He has published various papers in peer reviewed journals.

Investigating the Ability to Identify New Constructions in Urban Areas Using Images from Unmanned Aerial Vehicles, Google Earth, and Sentinel-2

Hamid Reza Ghafarian Malamiri

Department of Geography, Yazd University, Yazd 8915818411, Iran

Abstract:

This study presents an analytical model to understand the dynamic behavior of surface-groundwater interaction in a stream-aquifer system in the presence of a clogging layer. The mathematical model consists of an unconfined aquifer of semi-infinite extent resting on a sloping impervious base and interacting with a stream of varying water level. The hydro-interaction is mediated by a thin clogging layer whose hydrologic properties are different from that of the aquifer. The unsteady groundwater flow is approximated by linearized advection-diffusion equation subjected to mixed boundary conditions, including a nonlinear Robin boundary condition. Closed from analytical expressions are developed for water head distribution, flow rate and volumetric exchange of water between stream and aquifer. In few limiting cases, the results reduced to earlier known results. Performance of analytical solution is compared with numerical solution of corresponding nonlinear Boussinesq equation. Sensitivity of the aquifer parameters is analyzed with an illustrative example.

Biography:

Dr. Hamid Reza Ghafarian Malamiri obtained his BSc (Soil and water science engineering) from the Tehran University, Iran and his MSc (Geoinformatics) from Twente Univesity, The Netherlands, and his PhD (Remote Sensing) from the Delft University of Technology, Netherlands. He is previously worked for the Yazd Municipality as the Mayor's consultant and from 2014 up to now as associate Prof at department of Geography in Yazd University, Iran. His PhD research was "Reconstruction of gap-free time series satellite observations of land surface temperature to model spectral soil thermal admittance". His area of interest is time series analysis, Thermal Remote sensing, water management, precision agriculture, Drone application in agriculture and city management. She has published various papers in peer reviewed journals.

Triassic and Liassic Paleoenvironments during the Central Atlantic Magmatique Province (CAMP) Effusion in the Moroccan Coastal Meseta

Rachid Essamoud

Hassan II University of Casablanca, BP 7955, Faculty of Sciences Ben M'sik, Sidi Othmane Casablanca, Morocco

Abstract:

During the Early Mesozoic, the northwestern part of the African continent was affected by initial fracturing associated with the early stages of the opening of the Central Atlantic (Atlantic Rift). During this rifting phase, the Moroccan Meseta experienced an extensive tectonic regime. This extension favored the formation of a set of rift-type basins, including the Mohammedia-Benslimane-ElGara-Berrechid basin. Thus, it is essential to know the nature of the deposits in this basin and their evolution over time as well as their relationship with the basaltic effusion of the Central Atlantic Magmatic Province (CAMP). These deposits are subdivided into two large series: The Lower clay-salt series attributed to the Triassic and the Upper clay-salt series attributed to the Liassic. The two series are separated by the Upper Triassic-Lower Liassic basaltic complex. The detailed sedimentological analysis made it possible to characterize four mega-sequences, in the Triassic series. A progressive decrease observed in paleo-slope over time led to the evolution of the paleoenvironment from a proximal system of alluvial fans to a braided fluvial style, then to an anastomosed system. These environments eventually evolved into an alluvial plain associated with a coastal plain where playa lakes, mudflats and lagoons had developed. The presence of these evaporites indicates a climate that favored their precipitation, in this case a fairly hot and humid climate. The sedimentological analysis of the supra-basaltic part shows that during the Lower Liassic, the paleopente after basaltic effusion remained weak with distal environments. The faciological analysis revealed the presence of clastic and evaporitic lithofacies organized in two mega-sequences: the sedimentation of the first rock-salt mega-sequence took place in a brine depression system free, followed by saline mudflats under continental influences. The upper clay mega-sequence displays facies documenting sea level fluctuations from the final transgression of the Tethys or the opening Atlantic.

Biography:

Dr. Rachid ESSAMOUD obtained his Master's degree (geology) from the University of Bourgogne-Dijon (France), his doctorate (geology) from the University of Bourgogne-Dijon (France) and his State doctorate (Phd) from Cadi University Ayyad of Marrakech (Morocco). His doctoral research was based on the use of sedimentological methods and genetic stratigraphy in the search for the coal potential of coal basins. He currently teaches sedimentary geology and coal geology at Hassan 2 University in Casablanca. His area of interest is sedimentology, sequence stratigraphy and analysis of Carboniferous, Permian and Triassic basins. He has published dozens of articles in peer-reviewed journals and organized several international congresses of geology.

A Multi-Disciplinary Overview of Factors Controlling on Meiofauna Assemblages around Maden and Alibey Islands in Ayvalik (Balikesir, Eastern Aegean Sea)

Ipek F. BARUT

Istanbul University, Institute of Marine Sciences and Management, 34134 Vefa, Istanbul, Turkey

Abstract:

Environmental pollution became common mainly in the second half of 20th century, because of dumping of materials, such as manganese, lead and iron to terrestrial and marine environments. In coastal parts of the study areas, heavy metals containing ground water flows along the faults and fractures and reaches at sea. Heavy metals and other chemical and radioactive elements found in the surrounding country side have been naturally transported into the adjacent sea water during the past and present. The introduction and deposition of heavy metal with terrestrial origin in marine biota result in an environmental risk for aquatic life. In these contaminated waters, morphologically abnormal individuals of the affected meiofauna (benthic foraminifera, ostracod, mollusc) have been found. Three cores were taken from the seafloor in the four separate stations that are located in NW of Ayvalık village, around Alibey and Maden islands, and one core of each three core groups was studied. The ninety-one sediments obtained from cores found in the study area samples were analyzed.

Lead, manganese, hematite and limonite deposits with small reserves were pre sent in Alibey, Maden and Küçük (Small) Maden islands. High abundance of individuals with morphological changes and coloring were observed in benthic foraminifer species tests such as Peneroplis pertusus, P. planatus, Lobatula lobatula, Ammonia compacta, A. parkinsoniana, Challengerella bradyi, Elphidium complanatum, E. crispum. Also managing the ore beds led to significant morphological changes in foraminiferal assemblages. The abnormal test development observed in foraminifera and presented in this study are suggested to be the result of biological effects of the heavy metals that reached marine environment, and this phenomenon can be used as a practical indicator to determine the natural environmental pollution. The aim of this study is to figure out the effects of the chemical and radioactive elements, which were carried from the land on the meiofaunal assemblages.

Biography:

She began her academic career in Istanbul University. She received her undergraduate degree (BSc.) in Istanbul University, Faculty of Engineering, Dept. of Geophysics in 1985. Then she had been different post-graduate studies:

Istanbul University, Faculty of Business Administration, Institute of Business Management, Program of Specialization in 1987, (Degree of MBA); Istanbul University, Institute of Social Sciences, Management, Organization and Politics of Administration in 1989, (Degree of MSc.); Istanbul University, Faculty of Business Administration, Institute of Business Management, Program of Specialization Marine Management in 1989, (Degree of MBA); Istanbul University, Institute of Marine Sciences and Geography, Marine Geology and Geophsics in 1990 (Degree of MSc.); Istanbul University, Institute of Sciences, Program of Applied Geology in 1993, (Degree of Geology High Engineer); Istanbul University, Institute of Sciences, Program of Applied Geology in 2001, (Degree of PhD.).

In addition, she has received different workshops and courses subject that ecological of bioindicators, and radiation in nature to the present. And that has numerous papers, oral presentations, projects, awards, and at the same time refereeing in some journals of her. Research interests are balneogeology (use of thermal mineral waters in health care), hydrogeology, hydrogeochemistry, environmental isotopes in hydrogeology, the role and interpretation of paleontological data in ecology, marine/sediment geochemistry, marine pollution, bioindicators and biomonitoring techniques in marine/coastal ecology, assessment of coastal marine pollution, statistical methods, environmental radioactivity. She has several national and international articles on groundwater hydrogeochemistry, marine/ estuarine chemical pollution, assessment of bioindicator and biomonitoring.

She is a member of The Chamber of Geophysical Engineers of Turkey (JFMO); IAEG (International Association of Engineering Geology and the Environment); Member of CERF (Coastal Education & Research Foundation).

Sand Fixation and Dust Prevention by Microbial Mineralization and its Mechanism in Kashi Area, China

Qu Jili

Kashi University, China

Abstract:

One of the ideas for suppressing dust storms in Kashgar is to solidify the surface layer of desert soil and improve its resistance to wind erosion. Traditional methods of plant reinforcement, physical and chemical reinforcement are either costly or polluting the environment. Microbially induced calcite precipitation (MICP) is an emerging low-carbon soil reinforcement technology, non-toxic and harmless, low cost, and has attracted increasing attention in the industry in recent years. At present, most of the research at home and abroad focuses on the research of MCP on ordinary sand soils, but there are few studies on desert soils containing sodium sulfate (Na2SO4). In this project, the widespread sodium sulfate-containing desert soil in Kashgar area will be tested by bioaugmentation and biostimulation method, and the wind erosion test, micro-penetration test, SEM and RXD test will be used to measure its wind erosion resistance under different experimental design conditions. This paper aims to explore the mechanism of sodium sulfate and nickel chloride in the process of MCP solidification of desert soil, the activation mechanism of dominant flora in local desert soil, and elucidate the optimal solidification parameters of local desert soil. Provide cutting-edge data to reduce or even completely eliminate sandstorms in Kashgar.

Biography:

Dr. Qu Jili obtained his BSc (Engineering Geology) from the University of Guilin for Science and Technology and his PhD (Environmental Geology) from the Tongji University. He has been worked for teaching and researching in universities in China as a teacher. His PhD research was based on the reinforcement of tunnel in soft soil for the subway and prevention of ground settlement in Shanghai. He currently lectures geotechnical engineering at Kashi University. His area of interest is soil reinforcement and modification, earthquake geology, ecological protection. She has published various papers in peer reviewed journals.

Short-Term Variations of Organic Compounds, Macro- and Trace Elements in Plants and Rhizosphere Soil

Irina Shtangeeva

St. Petersburg state University, Russia

Abstract:

Elemental composition of different plants can vary depending on various environmental conditions. Among others, temporal variations are of special interest. Until now, more attention has been paid to long-term (seasonal and annual) changes. However, information on short-term variations of organic compounds as well as mineral elements in plants and in the rhizosphere soil is still limited. The mechanisms of the short-term (within several hours) changes in the concentrations of elements in different plants and in the rhizosphere soil of the plants are not clearly understood. It can be assumed that the fluctuations of the plant element composition under stable conditions have a cyclic nature due to regular rhythms of different biochemical processes. The aim of the research was to study diurnal variations in the concentrations of organic compounds and different macro- and trace elements in widely distributed plant species and in the rhizosphere soil. It was found that changes in the concentrations of many elements in the rhizosphere soil during day can be significant and differ in the soils taken from roots of different plants if though the plants grow at the same place and under the same conditions. The daily fluctuations of element concentrations in roots and leaves of the plants were also large. In many cases, a decrease of element concentration in roots correlated with an increase of its concentration in leaves. Considering such a short-term variability of element concentrations in plants and in the rhizosphere soil, it is necessary to carefully choose the timing of sampling to ensure the correct interpretation of experimental data.

Biography:

Dr. Irina Shtangeeva is senior researcher at St. Petersburg state University. Her main scientific interests are biogeochemistry of poorly studied trace and ultratrace elements. During last years she performed field and greenhouse experiments with crops and wild plants studying the mechanisms of variability of element concentrations in the plants and factors affecting the biogeochemical processes. Dr. Shtangeeva has published more than 80 articles in peer-reviewed Journals.

In-situ Stress Analysis of Ahnet Basin, Western Algeria: a 1D Geomechanical Approach

Youcef Bouchachi

Laboratoire de Géophysique, Faculté des Sciences de la Terre, Algeria

Abstract:

This work aims to determine the present-day in-situ stress and pore pressure in the Ahnet Basin, Algeria, through a 1D geomechanical approach. We investigated the drilling-induced fracture (DIF) from FMI log data to ascertain the direction of maximum horizontal stress (SHmax) from the Ahnet Field. A mean orientation of N140° (+/-10°) has been interpreted, which is NW-SE (N140°-N320°), with a local variation of (+/- 20°) compared to fields such as Illizi, Hassi Messaoud, and North Algeria, which can be explained by depth variation and intrinsic rock properties. A 1.05 psi/ft gradient of overburden stress (Sv) has been obtained from density. Pore pressure has been estimated from the sonic log by a normal compaction trend, indicates a hydrostatic regime from the surface to the top of the Silurian unit with an average pore pressure gradient of 0.43 psi/ft and an overpressure regime against the hot shale unit with a gradient of 0.58 psi/ft caused by the high in situ temperature in the study area and possible activity of the mega-shear zone. The poroelastic approach under transverse isotropic vertical conditions (VTI) has been used to calculate the minimum and maximum horizontal stress magnitudes. The outlines indicate a high-stress gradient close to 0.82 psi/ft, for Shmin calibrated with MDT stress points and 1.10 psi/ft for SHmax. The stress magnitudes results, suggest a present-day normal to strike-slip stress regime in the Ahnet Basin. Fault reactivation potential at two Silurian units has been inferred from the frictional theory analysis. The results indicate that increased pore pressure in hot shale formations due to by fluid injection and hydraulic fracturing causing shear slippage of the pre-existing faults, resulting in induced seismicity. Our study has contributed to the understanding of stress state origin in Ahnet Basin, the relationship between in situ temperature and pore pressure, and the fault stability analysis in such unconventional reservoir development.

Biography:

Dr. Youcef Bouchachi obtained his MSc (Geophysics) from the University of Babezzouar (Algeria) and he is preparing his PhD (Geophysics) from the same University. He is previously worked for Exploration division of SONATRACH as exploration geophysicist from 2014 to 2018. He joined the unconventional department of SONATRACH, where he works as a geomechanics engineer since 2022, after that he joind the joint venture of SONATRACH-PERTAMINA-REPSOL as a reservoir geologist. His PhD research was based on the application of in-situ measurement to estimate the stress state in the Saharan platform basin of Algeria. He has published two papers in peer reviewed journals.

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Advances In Statistical Modelling of the Large Scale Snow Depth Spatial Correlation Structure – Implications for Operational Snow Analyses

Cezar Kongoli

Earth System Science Interdisciplinary Center (ESSIC), University of Maryland College Park, USA

Abstract:

This study presents a new method for modelling regional snow depth spatial correlation structure from in situ observations. Horizontal and vertical distance correlations are computed from daily snow depth collected during the 2012-2016 winter months over a well sampled part of North America. To this end, the study area is separated into two regions, the eastern part with relatively flat topography for computing horizontal correlations and the western part characterized by high mountain terrain for computing vertical correlations. Binned correlations are computed by resampling irregularly spaced stations into a grid square of 10 km. Binned vertical correlations are computed for a vertical separation distance of 100 m and only considering adjacent grid squares to minimize the influence of horizontal separation. Next, the binned correlations of observed daily snow depth and its daily increment are fitted to exponential correlation functions using the least square method to estimate the correlation scale parameters including the amplitude, which represents short distance correlation. Our assessment suggests a large horizontal e-folding correlation length scale for the observed snow depth and the daily increment at 430 km and 370 km, respectively, when the fit to equations includes an amplitude estimate, which is less than 1. These large horizontal scales indicate that in regions with limited topography and sparse network of stations snow depth and its daily variations may be better analyzed using data with greater horizontal separation. Over mountainous terrain, vertical e-folding correlation scale for observed snow depth is estimated at 461 m, which is much smaller than that for the daily snow depth increment estimated at 1167 m and for the snow depth increment used in operational snow analyses at 800 m. That means that optimal interpolation-based analysis of the increments may be more accurate than the interpolation of snow depth data.

Biography:

Dr. Cezar Kongoli obtained his BSc (hydrology) from Tirana University, Albania, his MSc (Soil and Water) from Wageningen University, the Netherlands, and his PhD (environmental biophysics) from the University of Madison-Wisconsin, USA. For the last 20+ years his research has been in satellite remote sensing, land surface modelling and spatial statistical analysis of geophysical parameters with a strong emphasis on snow. Dr. Kongoli currently works at Earth System Science Interdisciplinary Center (ESSIC) of University of Maryland College Park and at NOAA/NESDIS as affiliate scientist. He also lectures statistics at the Department of Mathematics and Statistics of American University in Washington DC. Dr. Kongoli has published over 50 refereed papers in scientific journals and has more than 120 non-refereed publications. He has served as member of national and international scientific panels.

Automated Mapping of Land Use/Land Cover in Google Earth Engine Platform using Machine Learning Algorithm

Xia Pan

College of Resources and Environmental Economics, Inner Mongolia University of Finance and Economics, Hohhot 010010, Inner Mongolia, China.

Abstract:

(1) Background: Because land cover mapping often utilizes supervised classification, which can have issues with insufficient sample size and sample confusion, this study assessed the accuracy of a fast and reliable method for automatic labeling and collection of training samples; (2) Methods: Based on the self-programming in Google Earth Engine (GEE) cloud-based platform, a large and reliable training dataset of multispectral Sentinel-2 image was extracted automatically across the study area from the existing MODIS land cover product. To enhance confidence in high-quality training class labels, homogeneous 20 m Sentinel-2 pixels within each 500 m MODIS pixel were selected and a minority of heterogeneous 20 m pixels were removed based on calculations of spectral centroid and Euclidean distance. Further, the quality control and spatial filter were applied for all land cover classes to generate a reliable and representative training dataset that was subsequently applied to train the Classification and Regression Tree (CART), Random Forest (RF), and Support Vector Machine (SVM) classifiers. This approach generated a new Sentinel-2 land cover map for each classifier with the same legend as the MODIS product; (3) Results: The CART classifier appeared to be most suitable for this automatic workflow scheme, as its overall accuracy of 86.38% and kappa coefficient of 0.86 were greater than corresponding values for RF or SVM classifiers; (4) Conclusions: The proposed method can automatically generate a large number of reliable and accurate training samples in a timely manner, which is promising for future land cover mapping in a large-scale region.

Biography:

Xia Pan has completed her graduate from Inner Mongolia Agricultural University (China) Department of Ecological Environment in 2026 and obtained a postgraduate recommendation without examination with a major in Resources Environment and Urban Management and Water and Soil Conservation, and Land Degradation Control Science and Research Object: Environmental monitoring.

From 2016 to 2021, she has been a Ph.D candidate in Inner Mongolia Agricultural University (China) Department of Desert Control Science and Engineering. She has been a visiting Ph.D. Student at Temple University (USA) Department of Earth and Environmental Science with a Research Object: Intelligent Extraction Method of Land Cover Types based on Remote Sensing Images.

Since March, 2022, Xia Pan is working in College of Resources and Environmental Economics, Inner Mongolia University of Finance and Economics

Seismic Signals model in Agusan del Sur through Symbolic Regression with Genetic Programming: A stochastic dynamical system Approach

Teotima Evangelista Gorre

Department of Applied Mathematics, Agusan del Sur State College of Agriculture and Technology, Tagoloan, Misamis Oriental, Mindanao, Philippines

Abstract:

The magnitude of an earthquake is the energy released by the earth when there is a movement of plate in the core while the seismic signal in the intensity of the energy release by the plate. Symbolic regression (SR) is another type of regression analysis uses a stochastic process for finding the models from the space (phase or state space) of a topological dynamical system and the law of evolution of such functions or models in a dynamical system. It is an evolutionary algorithm aimed to recapitulate a set of measures in a n- dimensional space, used to describe the relationship of measurable functions (sets of functions or distributions) in a pre - defined rules. The study introduces an innovative seismic signal model of Agusan del Sur.

Biography:

Professor Teotima Evangelista Gorres obtained her Bachelor of Science in Mathematics from Central Mindanao University, Mindanao, Philippines and her PhD in Applied Mathematical Sciences (in her dissertation writing) from the University of Science and technology of Southern Philippines. She is previously worked as a college instructor at Southern de Oro Philippines College teaching Physics, Chemistry, Calculus subjects, and other mathematics subjects. Her PhD dissertation paper is Statistical Properties of Parameter Estimates in Symbolic Regression based on the application of Dynamical System and Ergodic Theory. In her dissertation paper she will introduce the theory of statistical properties of symbolic regression. She currently lectures Dynamical System, and Numerical Analysis, at the Agusan del.

The Syrian Plesiosaur: The First Articulated Skeleton from Middle East

Wafa Adel Alhalabi

Laboratory of paleontology in Ribeirão Preto, São Paulo University, Brazil

Abstract:

The Syrian territory, officially the “Syrian Arab Republic”, is entirely located in the Arabian plate. It comprises four major tectonic zones, including the Palmyrides, the largest topographic structure of the country, encompassing its west and central portions. The tetrapod fossil record in Syria is very scarce, with few findings documented in the scientific literature. This includes a theropod dinosaur tibia from Late Cretaceous beds around Damascus, teeth, jaws, vertebrae and limb bones of turtles, crocodiles, and plesiosaurs from the Cretaceous phosphorite deposits around Palmyra, besides Pleistocene mammal fossils collected from the Al- Latamne site, near Hama. Here, we present preliminary results on a plesiosaur fossil found during 2017 in the Khneifiss phosphorite deposits, in the central part of the southwestern Palmyrides. The material came from the As Sawwanah Sharqiyah mines, approximately 200 km northeast of Damascus, which exposes deposits of the Late Cretaceous (Late Campanian) Sawwanah Formation. The nearly six meters long specimen is composed of 52 partially articulated vertebrae, including posterior cervical, trunk, sacral, and proximal caudal elements, besides some ribs. This is the first plesiosaur partial skeleton found in Syria and the Middle East. Previously, few teeth, some vertebrae, propodial bones, and a rostral skull section have been reported from other countries in the Arabian plate. Preliminary taxonomic assessments indicate the close affinity of the new plesiosaur to Elasmosaurus.

Biography:

Dr. Wafa Adel Alhalabi graduated from Damascus University in 2004, Faculty of Biology. Then in 2008, she got her master’s degree from the University of Damascus in cooperation with the University of Poitier in France in the field of environment. In November 2021, she defended her PhD in the field of paleontology at the University of São Paulo, Brazil. Her PhD title is “A comprehensive review of the appendicular skeleton characters employed in early dinosaurs phylogenies”. She worked as an environmental consultant in Arabic World for 8 years and in Africa for 4 years. She is currently working at the paleontology lab in São Paulo University, campus Riberão Preto. Meanwhile, she is currently describing several vertebrate fossils from Syria, including but not limited to mammalian, turtles, and pterosaur fossils. Her area of interest is the vertebrate fossils from the Arabian plate.

Tsunami Generation and Amplification by Multiple Air Pressure Waves Over Seabed Topography

Taro Kakinuma

Kagoshima University, Japan

Abstract:

Tsunamis were widely observed when the large eruption of Hunga Tonga–Hunga Ha'apai volcano occurred in January 2022. In the present study, numerical computations have been performed using a nonlinear shallow-water model of velocity potential to study the fundamental processes of tsunami generation and amplification by air pressure waves. When an air pressure wave catches up with an existing tsunami propagating as a free water wave on a horizontal seabed, the tsunami height increases while a forced water wave, which has been produced by the Proudman resonance and follows the air pressure wave, overlaps with the existing tsunami. However, the tsunami height returns to its previous value after the superposition. Conversely, when an air pressure wave catches up with an existing tsunami over an abrupt change in water depth, the amplified tsunami propagates in the shallower water. An existing tsunami propagating as a free water wave on a sloping seabed can also be amplified by passing air pressure waves. Tsunamis created by a fast-moving atmospheric Lamb wave, such as in a trench, may be amplified by several subsequent air pressure waves during propagation with spatially varying water depths.

Biography:

Dr. Taro Kakinuma obtained his PhD (Coastal Engineering) from the University of Tokyo. He is previously worked for Port and Airport Research Institute, Independent Administrative Institution. His area of interest is the generation mechanisms of tsunamis due to a landslide, volcanic eruption, and meteorological change. He is also interested in nonlinear and dispersive river tsunamis, distant tsunamis, internal waves, and floating-body waves. He also researches beach seepage flows and the statistical properties of remote islands.

Effect of Elevated Pressure and Temperature on Seepage Characteristics of Mixed Wettability Porous Media

Xindi LV

School of Geosciences, China University of Petroleum (East China), Qingdao, Shandong, China

Abstract:

Wettability is one of the critical factors affecting fluid distribution and fluid repulsion efficiency within sandstones, and its accurate characterization is crucial for improving gas reservoir recovery. The variation pattern of wettability of rock mineral composition in sandstone reservoirs under high temperatures and high-pressure conditions in deep strata is still unclear. In this paper, we combine molecular dynamics simulation and phase field method to study the variation law of wettability of different minerals under high temperature and high-pressure conditions and carry out a micro-visualization simulation of percolation in mixed wettability porous media. The results show that the wettability of minerals in sandstone is mostly water-wet, and kaolinite is gas-wet; the temperature and pressure of the formation have a particular influence on the wettability of minerals, among which the temperature condition has a more significant influence, and the wettability angle of quartz surface decreases from 32 degrees to 5 degrees from 25°C to 150°C; the residual saturation of gas phase is positively correlated with the content of kaolinite; the influence of temperature decreases with the increase of kaolinite content. This work helps characterize the mechanism of gas-water transport under stratigraphic conditions and has important implications for the development of deep gas reservoirs and the improvement of recovery rate.

Biography:

Xindi LV is pursuing her PhD in Engineering (Geological Resources and Geological Engineering) at China University of Petroleum (East China). Her Ph.D. research focuses on the simulation of formation seepage mechanisms based on molecular dynamics simulation and digital core technology. Her area of interest is seepage mechanics.

Sulfide Inclusions and Melt ‘Pockets’: Evidence of The Garnet Megacrysts' Formation and Transformation

Anna V. Aseeva

The Far East Geological Institute of Russian Academy of sciences, Vladivostok, Russia

Abstract:

The megacrysts, large monocrystals of feldspar, clinopyroxene, garnet, orthopyroxene, spinel, and other minerals, enclosed in Cenozoic alkali basalts of the Shavaryn-Tsaram paleovolcano cone (Tariat, Khangai Plateau, Mongolia) have been studied. They are the key objects for the mantle petrology since can be used for the PT conditions reconstruction. The garnet-bearing varieties among the whole range of the inclusions in the Shavaryn-Tsaram basalts, namely garnet megacrystals, garnet-clinopyroxene intergrowths and garnet-bearing nodules of ultrabasic rocks were chosen, since garnet is a well-studied and informative thermodynamic modeling object.

The peculiar garnet megacrysts with silicate melt and multiphase inclusions, as well as sulfide mineral inclusions were detected. They have never been found previously in garnet megacrysts We believe that the syngenetic to garnet megacrysts sulfide inclusions reflect the conditions of garnet growth, while the melt pockets reveal the garnet transformations during exhumation. It has been established that syngenetic sulfide inclusions confined to the growth zones of garnet megacrystals and formed due to the presence of two immiscible melts: strongly fluidized silicate and sulfide.

According to isotopic data both sulfides (δ34S -0.1-0.4‰; Δ33S -0.00-0.03‰,) and host garnets (δ18OVSMOW 5.4 to 5.8‰) have a mantle source. The arrangement of sulfide inclusions swarms is due to the unusual linear-globular supramolecular structure of garnet megacrysts resulting from epitaxial growth. The silicate inclusions, both melt and multiphase, evidenced the evolution of garnet megacrysts in alkali-basalt melt. According to modeling data on Win TWQ 2.32, garnet was trapped by the basalt at P= 0.8-1 GPa and T=1120-1160oC, whereas multiphase silicate inclusion crystallization occurred at the same pressures, but lower temperatures (P= 0.85-0.95 GPa and T=790-950oC). Thus, we consider megacrysts as a product of heterogeneous nucleation of fluid or highly fluidized magma in a polybaric magma chamber system in the Earth’s depth.

Keywords:

alkali basalts, megacrysts, garnet, melt pockets, sulfides, deep nodules, Win TWQ 2.32, Shavaryn-Tsaram, Mongolia

Biography:

Dr. Anna Aseeva obtained her BSc and MSc (Geology) from the Russian Far East Technical University, and her PhD (Geology) was from the Far East Geological Institute (RAS, Vladivostok, Russia). Anna’s dissertation ‘Mineral assemblages in the sapphire-bearing placers of Primorye; in search of the sapphire source’ based on comparison of the Australian and Russian sapphire-bearing placers and studding their parental sources. Her current research focuses mainly on mineralogy, petrology and geochemistry of Cenozoic volcanic systems. Dr Aseeva also teaches ‘Geology of Russia’, ‘Metamorphism’ and ‘Geology of Continents’ at the Far Eastern Federal University (Vladivostok). She has published various papers in peer reviewed journals:

https://orcid.org/0000-0001-5809-8125.

Carbon Isotope Shift and Environmental Changes Associated With Extinction Across the Triassic-Jurassic Transition: Insights from the Qiangtang Basi

Fangzhi Hu

School of Geoscience and Technology, Southwest Petroleum University, Chengdu 610500, China

Abstract:

The end-Triassic mass extinction is relatively poorly-known among the five major extinction events in the Phanerozoic. Moreover, the typical marine Triassic-Jurassic (T-J) records are absent in regions other than the western Tethys and Boreal realms, and thus major questions remain as to the global significance and driving mechanisms of the event. Especially in the eastern Tethys, no marine sedimentary records of the T-J transition are known from open marine facies, and thus the extent and significance of the marine T-J transition are unclear. Through the sedimentary sequence characteristics and biochronostratigraphy, we place the T-J boundary at the top of grainstone layers representing the shallowest water deposit. We show the first high-resolution carbonate carbon-isotope record from a marine T-J section (Wenquan section) in the northern Tibet, China. Our results reveal that the carbonate carbon-isotope record contains two different excursions. It corresponds well with the “initial” and “main” negative carbon-isotope excursions found in the global stratotype section and point (GSSP), strongly suggesting their global nature. We investigate the marine sediment geochemistry and fauna from the section across the Triassic-Jurassic boundary. The study shows that the main pulse of the Late Triassic extinction occurred in Bed 8, manifesting as the disappearance of four brachiopod species, a significant decrease of other faunas, and the “Lilliput Effect” on bivalves. Analyses of pyrite framboids and redox-sensitive trace elements, suggest the development of photic zone anoxia near the T-J boundary and coincident with the Late Triassic extinction. Thus, the development of abrupt and intense photic-zone anoxia could play an important role in the end-Triassic extinction.

Key words:

Triassic-Jurassic boundary, East Tethys, carbonate carbon isotope, Photic-zone anoxia, Late Triassic extinction

Biography:

Fangzhi Hu is PhD candidate at the Southwest Petroleum University. She obtained her BSc (Geology) from the Engineering & Technical College of Chengdu University of Technology and master's degree (Paleontology and Stratigraphy) from the Chengdu University of Technology. His PhD research was based on the biological and marine environmental changes near the Triassic-Jurassic boundary in the Qiangtang Basin, Eastern Tethys. His area of interest is Triassic-Jurassic boundary, Paleo-ocean environment changes, Biological extinction.

Organic Matter Enrichment in a Terrestrial-Marine Transitional Environment, Driven by Climate and Preservation in the Upper Triassic Succession from the Qiangtang Basin, Tibetan Plateau

Fei Lin[a,b,c]

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[b] *School of Geoscience and Technology, Southwest Petroleum University, Chengdu 610500, China*

[c] *Qiangtang Institute of Sedimentary Basin, Southwest Petroleum University, Chengdu, Sichuan, 610500, China*

Abstract:

Different from organic matter accumulation in marine and continental environments, organic matter enrichment mechanism in terrestrial-marine transitional environments is still unclear. The Late Triassic Qiangtang Basin is a typical shoreland-delta transitional facies in China. Besides, Late Triassic organic-rich mudstones are important petroleum source rocks in the Qiangtang Basin. Based on B/Ga ratios, gammacerane indices and spores and pollen grains, our work demonstrates a saline water environment and warm and humid climate during the deposition of organic-rich sedimentary rocks. The framboids size distribution, enrichment factor of elements show the Late Triassic organic-rich mudstones were deposited under euxinic-anoixc environments. Low excessive copper (Cuxs) and excessive nickel (Nixs) contents in the organic-rich mudstones indicate a low primary productivity. We suggest that warm and humid conditions, terrestrial plants input and euxinic-anoixc environments are the factors controlling organic matter accumulation during the Late Triassic organic-rich deposition. A climate-drive, good reservation condition model for organic matter accumulation in transitional environments is proposed in this study. The warming climate created a habitable environment for both continental and marine organisms. Sustained freshwater input brought quantities nutrients and terrestrial organic matter to the aqueous system, relatively reduced water column prevent these substances from being oxidized. Their joint role build high organic matter accumulation.

Key words:

geochemistry; framboid pyrite; organic-rich mudstone; transitional environment; Qiangtang Basin; Tibet

Biography:

Fei Lin is a PhD candidate at the Southwest Petroleum University in China. He obtained his BSc 0(Palaeobiology and Stratigraphy) and master's degree (Sedimentology) from the Chinese Academy of Geological Sciences. His PhD research was based on the deposition process and paleoenvironment of organic-rich mudstones in the Qiangtang basin. His area of interest is clastic rock, sedimentology, geochemistry and paleoenvironment.

Age Assignment of Dolomite Palaeo-Reservoirs in the Qiangtang Basin: New Evidence from Paleontology and Carbonate In-Situ U-Pb Dating

Jian Zhang[a,b,c,d]

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[d] *State Key Laboratory of Oil and Gas Geology and Exploitation, Southwest Petroleum University, Chengdu, Sichuan 610500, China*

Abstract:

Petrographic and geochemical analyses of hydrocarbon reservoirs requires a reliable chronological framework for a comprehensive understanding of the depositional history and diagenetic alteration processes. The carbonate in-situ U-Pb geochronology provides new insights to solve this issue. The Qiangtang Basin, located in the eastern Tethys tectonic domain, is a typical petroliferous superimposed basin with more than 200 hydrocarbon shows. The Middle Jurassic carbonate palaeo-reservoir is considered one of the most favorable successions to evaluate the accumulated oil and gas potential in the Qiangtang Basin. Although several studies focused on this carbonate succession, the depositional history and digenetic processes are still controversial due to the lack of precise geochronological evidence. Here, we report carbonate U-Pb ages, foraminiferal biostratigraphy, and petrography of palaeo-reservoir rock units to constrain the chronology of dolomite reservoir and the relationship between dolomitization processes and hydrocarbon accumulation on basin-scale fluid flow events. Results, including U-Pb ages of fine crystalline dolomite (221.7 ± 6.3 Ma), middle-coarse dolomite (210.1 ± 9.4 Ma), vein calcite (203.4 ± 4.9 Ma), and marker species of foraminifers (such as Variostoma sp. and Siphovalulina sp.), show that the proposed age constraints of the palaeo-reservoir are Late Triassic, denying previous suggestions of a Middle Jurassic age. In addition, this study provides insights into the ages of dolomitization, cementation, hydrothermal events, and hydrocarbon accumulation events. Ages of matrix dolomites and calcite veins also suggest an early hydrocarbon accumulation and destruction event in the Late Triassic. The Upper Triassic reservoir is associated with the Lower Jurassic cap rocks, providing a complete petroleum system in the Qiangtang Basin.

Key words: U-Pb geochronology; foraminiferal biostratigraphy; Palaeo-reservoir dolomite; Qiangtang Basin; Tibet

Biography:

Jian Zhang is a joint PhD candidate at the China University of Geosciences Beijing and the Chinese Academy of Geological Sciences. He obtained his BSc (Resources Exploration Engineering) and master's degree (Geological Engineering) from the Chengdu University of Technology. His PhD research was based on the deposition and diagenesis process of palaeo-reservoir carbonate in the Qiangtang basin. His area of interest is Dolomitization, Reservoir Evaluation, sedimentology, and U-Pb geochronology.

Multiple Carbon Isotope Excursions During the Carnian (Late Triassic) Pluvial Event: Implications for Global and Regional Perturbation

Puyang Ke

School of Geoscience and Technology, Southwest Petroleum University, Chengdu, Sichuan, 610500, China

Qiangtang Institute of Sedimentary Basin, Southwest Petroleum University, Chengdu, Sichuan, 610500, China

Abstract:

This study presents a new insight to understand the mechanism of negative carbon isotope excursions (NCIEs) during the Carnian Pluvial Event (CPE). The study provides a high-resolution carbonate carbon isotope (δ13Ccarb) record and major-trace element data from the well QZ-8 in the Qiangtang Basin, eastern Tethys. The Late Triassic Carnian pluvial event (CPE) was an interval marked by a global climatic and environmental change that occurred simultaneously with enhancement of hydrologic cycle. This event is characterized by multiple negative carbon isotope excursions (NCIEs). However, the driving mechanism of multiple NCIEs remains elusive because each of the NCIEs has different magnitudes in different geological settings. The carbon-isotope profile from this study in the Qiangtang Basin, eastern Tethys displays a similar trend to those in contemporaneous strata in the NW Tethys and South China, which is characterized by a distinct negative excursion during the CPE supporting a global event. Interestingly, results from this study present the first five NCIEs in the marine sedimentary succession. We use Ti/Al, Sr/Ba and Sr/Al to indicate hydrological cycle changes. Furthermore, Carbon isotope records are almost synchronous with higher Ti/Al ratios and lower Sr/Al and Sr/Ba ratios, which can be observed in their multiple peaks with the NCIEs. From these peaks, the multiple changes of the hydrological cycle coincide with the NCIEs. Thus, according to geochemical data we consider that the long carbon-isotope excursion during the CPE was driven by global carbon cycle, while each of the NCIEs has suffered impaction of regional hydrological cycle.

Biography:

Mr. Ke Pursuing his PhD in Southwest Petroleum University, Chengdu, Sichuan, China (Geology). His PhD research was based on the relationship between paleoenvironment change and sedimentary event. His area of interest is event sedimentology, paleoclimate change, geochemistry, biogeochemistry and geomicrobiology.

Orbitally-Paced Climate Change in the Carnian Pluvial Event

Qian Zhang

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Qiangtang Institute of Sedimentary Basin, Southwest Petroleum University, Chengdu, China

Abstract:

The Carnian Pluvial Event led to violent fluctuations in the carbon cycle, substantial biological turnover, and significant changes in global climate. However, the lack of a high-resolution chronostratigraphic framework to define the temporal and spatial evolution of the Carnian Pluvial Event hampers the understanding of the triggering mechanisms. Here we present the astrochronology of episodic negative carbon isotope excursions of the Carnian Pluvial Event in the Late Triassic shallow marine environment of the Qiangtang Basin to explore the role of orbital-forcing for the Carnian Pluvial Event. The coupling relationship between each negative carbon isotope excursion and each terrigenous detrital input indicates that episodic negative carbon isotope excursions may be driven by pulses of terrigenous detrital input. A 13.16 Myr-long high-resolution astronomical time scale of the Bagong Formation is developed by astronomical tuning of gamma-ray logs to the stable 405-kyr long-eccentricity cycles. This floating ATS takes the U-Pb zircon as the anchor point and establishes the absolute astronomical time scale of the Bagong Formation from 220.4 ± 1.1 Ma to 233.16 ± 1.17 Ma. The new astrochronology reconstructed the Late Triassic sea level changes using the sediment noise model, which is generally consistent with coeval global sea level changes. The antiphase correlation of the filtered ~1.2 Myr cycles of the sedimentary noise model sea-level curve and the filtered ~1.2 Myr cycles of the obliquity modulation cycles demonstrates that the ~1.2 Myr modulation cycles may be the main driver of sea level changes during the Late Triassic. The ~1.2 Myr obliquity modulation maxima correlate well with the high sea level, episodic negative carbon isotope excursions, global warming, and the marine life crisis, suggesting that obliquity forcing may have played an important role during the Carnian Pluvial Event.

Biography:

Dr. Qian Zhang obtained his BSc (Geology) from the Southwest Petroleum University. My research specialty is paleoclimate and Milankovitch cycles. My latest research on the Carnian Pluvial Event shows that orbital forces played an important role in the event. I am currently studying Milankovitch cycles and paleoclimate restoration at Southwest Petroleum University. My area of interest is paleoclimate restoration and paleoclimate modeling. An article is currently being submitted.

Accelerated Hydrological Cycle During The Toarcian Oceanic Anoxic Event: Biomarker Evidence In The Qiangtang Basin, Eastern Tethys

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Abstract:

The early Toarcian oceanic anoxic event (T-OAE) is characterized by major changes in the marine and terrestrial environments, which is possibly related to the accelerated hydrological cycle. However, the impact of hydrological cycling on continental vegetation is poorly constrained. This study presents carbon isotope and organic geochemical data from the Sobucha section of Qiangtang Basin, eastern Tethys. The C27/C29 sterane ratios exhibit a general decreasing trend across the T-OAE, which is accompanied by increasing C30 17α, 21β-moretane/C30 17α, 21β-hopane (M/H) ratios and terrestrial aquatic ratios (TAR) suggesting an enhanced terrigenous input. The T-OAE interval records a decline in shelf sea oxygenation, which is indicated by Pr/Ph ratios and the enhanced preservation of C35 homohopanes. The decline in shelf sea oxygenation is most likely promoted by thermal and freshwater stratification. The higher gammacerane/C30 17α, 21β-hopane (G/H) ratios occurring at the beginning of the T-OAE indicate an intensified water-column stratification. The sterane/ C30 17α, 21β-hopane (ST/C30H) ratios also show a sharp decrease at the beginning of the T-OAE supporting the transformation of the biological community, and/or an increase in soil organic matter. The biomarker evidence suggests an accelerated hydrological cycle during the Toarcian carbon-isotope excursion (T-CIE), leading to enhanced transport of land plant organic matter to shelf seas. Acceleration of hydrological cycle leads to the increase of terrestrial material and freshwater input during T-CIE, and enhanced freshwater inflow supported water column stratification and deoxygenation. The increased input of terrigenous materials, enhanced freshwater input, and abrupt change in the biological community across the T-OAE may be attributed to an accelerated hydrological cycle associated with global climatic and environmental changes during the T-OAE.

Biography:

Mr. Yi Pursuing his PhD in Southwest Petroleum University, Chengdu, Sichuan, China (Geology). His PhD research was based on the relationship between paleoenvironment change and sedimentary event. His area of interest is event sedimentology, geochemistry and biogeochemistry.

Paleoenvironmental Reconstruction Prior to and at the Base of the Early Aptian Oceanic Anoxic Event in Southern Tibet, Eastern Tethys

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Abstract:

The Early Aptian Oceanic Anoxic Event (OAE 1a, ~120 Ma) represents an episode of severe paleoenvironmental disturbance during the Cretaceous, marked with widespread deposition of organic-rich sediments. The OAE 1a has been extensively studied in the Pacific, Boreal and western and southern Tethyan regions. However, few investigations regarding the OAE 1a have been conducted in the eastern Tethys (especially in southern Tibet). Here, we present high-resolution geochemical data to reconstruct paleoenvironmental conditions of the OAE 1a in the Gucuo area of southern Tibet, eastern Tethys. The content of Mo and U and Th/U ratios collectively revealed oxic-to-suboxic environments prior to and at the base of OAE 1a. A redox shift from oxic to suboxic condition was recorded prior to OAE 1a, while the redox condition was changed from suboxic to oxic at the base of OAE 1a. Both of the values of chemical index of alteration and the Ga/Rb–K_2O/Al_2O_3 and SiO_2–Al_2O_3+K2O+Na_2O bivariate diagrams reflected a warm-humid climate prior to and at the base of OAE1a. This climate condition was a regional response to global warming during this interval. Freshwater-dominated salinity conditions prior to and at the base of OAE 1a were unraveled by the ratios of B/Ga, Rb/K, and CaO/(CaO+Fe). Low salinity conditions during the deposition suggested that massive freshwater was injected into the ocean due to a warm-humid climate occurred in this interval. High bioproductivity driven by global warming was responsible for organic matter accumulation in the Gucuo area prior to and at the onset of OAE1a. Massive freshwater injection and enhanced runoff under a warming climate promoted fluvial delivery of nutrients into the ocean, and thus flourished marine bioproductivity. A high surficial bioproductivity would generate massive organic matter, contributing to organic matter enrichment.

Biography:

Ying Nie is now a PhD candidate at Southwest Petroleum University. He obtained his BSc (Geology) and master's degree (sedimentology) from Chengdu University of Technology. His PhD research was based on the paleoenvironmental reconstruction during the Early Aptian Oceanic Anoxic Event in the eastern Tethys. His area of interest is the paleoenvironmental reconstruction during the Mesozoic Oceanic Anoxic Events.

Space Exploration- Legal Challenges

Małgorzata Polkowska

War Studies University

Abstract:

This study presents the legal challenges of exploring space. Acquiring space resources can solve the problem of non-renewable resources ending up on Earth, including resources rarely found on Earth, and human exploration of the space. In the long run, it is not possible for it to be conducted on the basis of resources from the Earth. Space mining is a future branch of industry that does not exist yet, and is associated with the extraction of natural resources from celestial bodies. Even though we currently import only samples of material for research from space, serious companies are being set up to develop technologies related to the extraction of raw materials. Space mining is today treated as an inevitable and important element of the future world economy. However, there are a number of legal questions; including concerning the definition and characteristics of space resources (practically the only definition of resources is written only in US legislation). Taking into account the national and doctrinal practice, it can be assumed that a broad classification of space resources will arise in the future. For example, the resources of the moon will be regulated under international space law. However, it seems necessary to develop a universal legal definition of space resources.

Biography:

MAŁGORZATA POLKOWSKA, Associate Professor of International Law, specialization Aviation and Space law, Security and Defense; she was the first permanent Council Representative of the International Civil Aviation Organization for Poland and the Central European Rotation Group (CERG). She has over 21 years of experience in civil aviation, cooperation with many aviation organizations in Europe and around the world, including EASA, ECAC, EUROCONTROL. Lecturer at Polish and foreign universities (including McGill University in Montreal, Canada, de Paul in Chicago, US, ENAC Toulouse, France and University, City of London, UK); speaker and moderator of a number of Aviation and Space conferences; Author of over 150 publications in Polish and English on International law, including Air and Space; leader of the project under Ministry of Defense about space security. She lectures International Law, Aviation and Space Law and Security, Diplomacy Law at War Studies University in Warsaw in the position of Head of International Law Department.

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