



2022 International Conference on

Geosciences and Remote Sensing

GeoRS 2022

November 23-25, 2022

Online - Microsoft Teams

CONFERENCE PROGRAM

China Standard Time - GMT+8

*** The Program is used for GeoRS 2022 Academic Exchange Only**

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Part I Conference Schedule Summary

Day 1 - November 23, 2022 / China Standard Time - GMT+8

Online MS Teams Link: <http://www.academicconf.com/teamslink?confname=geors2022>

09:00-11:00	MS Teams Online Conference Testing and Ice Breaking
14:00-16:00	

Day 2 - November 24, 2022 / China Standard Time - GMT+8

Online MS Teams Link: <http://www.academicconf.com/teamslink?confname=geors2022>

Opening & Welcome Speech

09:00-09:05	Dr. Komali Kantamaneni , Faculty of Science and Technology, University of Central Lancashire, United Kingdom
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Keynote Speech: Wave Energy Demand for Earthquake Engineering Based on Vertical Array Strong Motion Records

09:05-09:50	Prof. Takaji Kokusho , Department of Civil & Environmental Engineering, Chuo University, Japan
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Invited Speech 1: Remote Sensing Data to Investigate the Preparation of Earthquakes

09:50-10:15	Dr. Marchetti Dedalo , College of Instrumentation and Electrical Engineering, Jilin University, China
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Invited Speech 2: Geophysical and Engineering Geological Evaluation of Major Highway Pavement Failure and Contemporary Solutions for Sustainability

10:15-10:40	Dr. Ademila Omowumi , Department of Earth Sciences, Adekunle Ajasin University, Akungba-Akoko, Nigeria
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10:40-11:00	Coffee Break
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Invited Speech 3: Official Topographic and Cartographic Information System of the Republic of Croatia

11:00-11:25	Dr. Robert Zupan , University of Zagreb, Croatia
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Invited Speech 4: Assessment of Climate Change and Coastal Inundation through Satellite-Derived Datasets

11:25-11:50	Dr. Komali Kantamaneni , University of Central Lancashire, United Kingdom
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11:50-12:20	Poster Session
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12:30-14:00	Lunch Break
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14:40-18:30	Oral Session 1: Geosciences
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Day 3 - November 25, 2022 / China Standard Time - GMT+8

Online MS Teams Link: <http://www.academicconf.com/teamslink?confname=geors2022>

09:00-12:15	Oral Session 2: Geology
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12:15-14:00	Lunch Break
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14:30-17:25	Oral Session 3: Remote Sensing
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Part II Keynote Speeches

Keynote Speech: Wave Energy Demand for Earthquake Engineering Based on Vertical Array Strong Motion Records



Prof. Takaji Kokusho

**Department of Civil & Environmental Engineering,
Chuo University, Tokyo, Japan**

Biography: Prof. Takaji Kokusho is Professor Emeritus at Chuo University since 2015. He obtained his BS and MS degrees from the University of Tokyo, and a MS degree at Duke University, USA. He completed his PhD (Doctor of Engineering) at the University of Tokyo in 1982 on the topic of "Dynamic soil properties and nonlinear seismic response of ground". Prof. Takaji worked at the Central Research Institute of Electric Power Industry (CRIEPI) between 1969 and 1995 as researcher, head, and director of Siting Technology for Earthquake Geotechnology. He was Professor at the department of Civil and Environmental Engineering at Chuo University between 1996 and 2015. In this time, he published more than 100 reviewed research papers in national and international journals and conference proceedings, and served as a chairman of Technical Committee No. 4 of ISSMGE (2005-2009), Earthquake Geotechnical Engineering, and Asian Technical Committee ATC3 of ISSMGE (1998-2005), and Geotechnology for Natural Hazards.

His research topics focus on:

- ▶ Dynamic soil properties and their evaluation
- ▶ Dynamic response of ground
- ▶ Liquefaction of sand/gravelly fines-containing sands
- ▶ Earthquake-induced slope failure
- ▶ Siting technology of energy facilities

Abstract. In earthquake engineering, acceleration has been playing a major role while wave energy has rarely been considered as a demand in design. In order to understand earthquake damage in terms of energy, the demand of wave energy in surface soils is studied here assuming one-dimensional SH-wave propagation, by using a number of vertical array records during 9 strong earthquakes in Japan in the last two decades. A drastic decreasing trend of the energy demand has been found in general with decreasing ground depth to be almost 1/10 from the bottom to the surface. A simple formula has also been developed to evaluate upward energy at a given soil from the bedrock using the corresponding S-wave impedance ratio. Incident energies extrapolated at seismological bedrocks using the depth-dependent variations have been found roughly compatible with a well-known empirical formula despite that individual fault mechanisms are utterly neglected. Also indicated quite unexpectedly is that the softer the surface soil is, the more drastically the energy demand tends to decrease. However, it may not be contradictory with a widely accepted perception that softer soil sites tend to suffer heavier damage as far as geotechnical influence is concerned, because induced soil strain tends to be larger due to decreasing soil stiffness despite the decreasing trend of energy demand there. There have been several design methodologies already developed by a research group including the present speaker

particularly in geotechnical engineering, wherein cumulative wave energy compared directly with corresponding capacity energy can conveniently determine liquefaction-induced strain/settlement or slope displacement during earthquakes almost uniquely despite potential differences in input motions. Thus, the demand energy-based design will pave the way to a simpler yet more reasonable design method.

Invited Speech 1: Remote Sensing Data to Investigate the Preparation of Earthquakes

Marchetti Dedalo^{1,*}

¹*College of Instrumentation and Electrical Engineering, Jilin University, China*

Abstract. Remote sensing data, especially from satellites, is well known to help characterise the effects of the earthquakes, both in terms of reconstruction of the geophysical phenomena (e.g., ground displacement from InSAR) and quick estimation of the possible damage to the buildings, even in difficult accessible areas.

However, in this talk, several examples will illustrate how the remote sensing satellites, especially geomagnetic missions like CHAMP, DEMETER, Swarm, and recently CSES, are helping to investigate possible ionospheric pre-earthquake disturbances. CSES (China Seismo-Electromagnetic Satellite) is a complete satellite platform dedicated to searching for possible ionospheric disturbances induced by the earthquakes in the World. It is equipped with many instrumentations and payload to monitor magnetic and electric fields, plasma parameters, particle detectors, and GNSS receivers.

Contributions of satellite data (and other remote sensing platforms) are not only limited to the missions mentioned above, but the weather satellites are also providing precious data collected in climatological archives. Such big data help understand possible disturbances in the atmosphere possibly induced by the preparation phase of medium ($M \sim 7$) to large ($M8+$) earthquakes in the World. Recent studies show that some atmospheric parameters tend to be affected by specific earthquakes, i.e., the focal mechanism, location, and geology play an essential role in the atmospheric and ionospheric pre-earthquake disturbances.

Finally, an overview of some results obtained by investigating more than 20 earthquakes that occurred in the last years will be presented in this talk. Moreover, it will be highlighted that extensive worldwide statistics results confirm the pre-earthquake disturbance in the atmosphere and ionosphere detected by remote sensing satellites.

Invited Speech 2: Geophysical and Engineering Geological Evaluation of Major Highway Pavement Failure and Contemporary Solutions for Sustainability

Ademila Omowumi

Department of Earth Sciences, Adekunle Ajasin University, Akungba-Akoko, Nigeria

Abstract. Roads are essential in trade and transportation system globally and serve as links between towns, states and countries. In Africa, roads are links to access education, health and social services. Scarcity of geological, geophysical and geotechnical data of subsoil upon which major roads were constructed prompted this study. Very low frequency electromagnetic (VLF-EM) and electrical resistivity methods involving 54 Schlumberger Vertical Electrical Sounding (VES) and 2-D geoelectrical resistivity imaging using dipole-dipole array were utilized along unstable (US) and stable sections (SS) of Owo-Ikare highway to establish causes of its persistent failure. Engineering evaluation of eighteen soil samples from test pits excavated on selected US and SS were investigated. VLF-EM models, geoelectric sections and 2-D resistivity structures revealed existence of conductive subsurface structures, suspected weak zones beneath the US. The road pavement is constructed on poor clayey subgrade with low resistivity values (<100 Ohm-m) which precipitate instability of the highway. Subgrade soils below US have poor geotechnical properties characterized by high moisture content, liquid limit (43.6–63.8% and 20.1–25.2%), plasticity index (13.4–34.4% and 6.5–8.3%), percentage fines (40–67% and 28–30%), A-7-5 to A-7-6 clayey soils, high linear shrinkage ($>10\%$), low compacted density, low CBR, volume changes (Mv) and impervious soils against those of SS. Thus, deep-weathering, fractured bedrock, uneven bedrock topography with subsurface structures, water-saturated clayey subgrade and unsuitability of the soils for subgrade and subbase road construction are responsible for instability of the road. Replacement of soil beneath the unstable sections with quality sandy soil and effective drainage would enhance its stability. This study offers adequate information towards durability of flexible road structures.

Keywords: Geophysical investigation, Geotechnical evaluation, Pavement failure, Road structures, Sustainable roads.

Invited Speech 3: Official Topographic and Cartographic Information System of the Republic of Croatia

Robert Zupan

University of Zagreb, Croatia

Abstract. The first part of the STOKIS project refers to the development of product specifications that are the result of the STOKIS project, namely TK25 (Topographic Map 1:25 000), TK50, TK100 and TK250. The project started on October 21, 2019 and lasted until today. To begin with, it should be noted that data (which can still be used in specifications to establish the STOKIS system) were previously collected in CAD format for each sheet separately. The basic source of all topographic-cartographic data and products are photogrammetric mapping data (restitution data) and other originals. These data are topologically processed, classified according to the CROTIS data model, and finally stored in the TTB. Topographic data for individual topographic databases (TBP) of smaller scales are performed by performing model generalization, in such a way that for each subsequent TB of smaller scales, model generalization from previously established TB of larger scales is performed. The purpose of the Product Specification is to ensure the appropriate quality to produce topographic data (TP) mapped from in this case our TTB (Basic Topographic Database) but also from other originals. A comprehensive document describing the quality elements as well as the tolerances described in this specification are the basis for quality control. The product specification describes the technical characteristics of the topographic data, and how this data should be collected and processed. In addition to the technical characteristics, this document also describes the content and format for data delivery. The product specification should also reflect the requirements for the use of topographic data. User needs will be the basis for future development and changes in product specifications are focused primarily on user needs (and their changes in use reflected in the product) more efficient methods/processes in production (new technology) and according to international and OGC standards, DIGEST standards Everything serves to make these products easier to read, more up-to-date and more usable in practical application.

Invited Speech 4: Assessment of Climate Change and Coastal Inundation through Satellite-Derived Datasets

Komali Kantamaneni

Faculty of Science and Technology, University of Central Lancashire, United Kingdom

Part III Oral Presentations

Online Oral Presentation Guidelines

- ✚ Online Oral Presentation will be conducted via [Microsoft Teams](#).
- ✚ All online presenters are requested to reach the Online Session Room prior to the scheduled time and deliver their presentations on time.
- ✚ The presentation timetable is shown in **China Standard Time (GMT+8)**.
- ✚ If a presenter is not able to show up via MS Teams, the session chair / conference secretary will download and play the pre-recorded video presentation during his/her scheduled presentation time; if listeners have questions about the presentation, please contact the conference secretary to forward the questions.
- ✚ If a presenter cannot show up on time or have problems with Internet connection, the session chair has the right to rearrange the presentation order and let the next presenter start.
- ✚ Signed and stamped electronic presentation certificate would be issued and delivered via e-mail after the conference.

Best Oral Presentations Award

The session chair will select one best oral presentation from his/her session based on the following criteria:

- ✓ Research Quality
- ✓ Presentation Performance
- ✓ Presentation Language
- ✓ PowerPoint Design

Best Presenters will receive an official certificate and free registration to the GeoRS 2023.

Oral Session 1: Geosciences

Time: 14:40-18:30, November 24, 2022. China Standard Time (GMT+8)

Session Chair: Dr. Yossi Mart, Leon Recanati Institute, University of Haifa, Israel

Online Session Room Link: <http://www.academicconf.com/teamslink?confname=geors2022>

14:40-14:55 GEO1060	Comparative Study of 2D Electrical Resistivity Tomography, Borehole and Aerial Photogrammetry for Feasibility Assessment of Granite Deposit <i>Dr. Muhammad Junaid, Sustainable Advance Geomechanical Engineering, National University of Science and Technology, Pakistan</i>
14:55-15:20 GEO1003	Birth Paroxysms of an Ocean: The Red Sea, the Levant Rift, and the Tectonics of Tiran Straits <i>Dr. Yossi Mart, Leon Recanati Institute, University of Haifa, Israel</i>
15:20-15:45 GEO1054	Spatio-temporal Variability of Precipitation Extremes and Drought Identification using Agro-Climatic Zones in the Mahi River Basin, India <i>Dr. Aditya Sharma, Department of Atmospheric Science, School of Earth Sciences, Central University of Rajasthan, India</i>
15:45-16:00 GEO1041	Impacts of Land Use Change on Ecosystem Service Value of Qilian Mountain National Park in Gansu Area <i>Dr. Chengpeng Lu, Institute of County Economic Development & Rural Revitalization Strategy, Lanzhou University, China</i>
16:00-16:10	Coffee Break
16:10-16:35 GEO1014	Microorganisms in Mining Waste Remediation Technologies <i>Dr. Alok Prasad Das, Department of life Sciences, Rama Devi Women's University, India</i>
16:35-17:00 GEO1004	Potential Impact of Sea Level Rise on the Geomorphology of Kuwait State Coastline <i>Dr. Ahmed Hassan, Faculty of Education, Matrouh University, Egypt</i>
17:00-17:20 GEO1023	Impact of the First Induced COVID-19 Lockdown on Air Quality in Israel <i>Dr. Sarit Agami, Department of Economics, The Hebrew University, Israel</i>
17:20-17:35 GEO1053	Diamonds and Dinosaurs: A New Model for Diamond Distribution in Brazil <i>Mr. Matt Forir, The Missouri Institute of Natural Science, United States</i>
17:35-17:50 GEO1047	Land Use and Local Environment Affect Macroinvertebrate Metacommunity Organization in Neotropical Stream Networks <i>Dr. Kele R. Firmiano, Departamento de Genética, Ecologia e Evolução, Universidade Federal de Minas Gerais, Brazil</i>
17:50-18:15 GEO1059	Water Resources Development and Management in Estuaries during Astronomical Events <i>Dr. Soufiane Haddout, Department of Physics, Faculty of Science, Ibn Tofail University, Morocco</i>

18:15-18:30 GEO1062	New Insights into the Shallow Aquifer Geometry and Saltwater Encroachment in the Chott El Jerid Region: Geoelectrical, Structural and Geochemical Approaches
	<i>Dr. Chaouki Khalfi, Laboratory of Water, Energy and Environment (LR3E), National Engineering School of Sfax, University of Sfax, Tunisia</i>

Abstracts of Oral Session 1

GEO1060 - Comparative Study of 2D Electrical Resistivity Tomography, Borehole and Aerial Photogrammetry for Feasibility Assessment of Granite Deposit

Muhammad Junaid¹, Rini Asnida Abdullah² and Radzuan Saari^{2,*}

¹*Sustainable Advance Geomechanical Engineering, National University of Science and Technology, Pakistan*

²*Faculty of civil Engineering, Universiti Teknologi Malaysia, Malaysia*

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Abstract. The rising demand for rock aggregates increases interest in new aggregate resource exploration. However, due to the low commodity price of aggregates products, an inexpensive technique other than costly conventional drilling is required. This research paper principally aims to critically analyze the efficacy of inexpensive and rapid 2D electrical resistivity tomography (2D ERT) survey for subsurface geological delineation of granite deposit. To this end, 2D ERT survey of the granite deposit was accomplished by six resistivity lines using Schlumberger protocol with inner and outer electrode spacing 5 m and 10 m respectively. Strong resistivity contrast enables inverted resistivity imaging to characterize the deposit such as topsoil (100-800 Ωm), fracture granite (800-2300 Ωm) and solid granite (>2300 Ωm). Three borehole samples were also collected to accurately estimate topsoil thickness. Furthermore, the bedrock to topsoil ratio estimated by 2D ERT and borehole independently was 3.2 and 2.2 respectively. The combine 2D ERT and borehole survey estimates the bedrock volume 3.2 times to topsoil. Thus, the research work allows us to conclude that 2D ERT is inexpensive, viable and efficient technique for subsurface geological documentation and helps in selection of appropriate mining method of granite deposit.

Keywords: 2D ERT, UAV, Granite, Feasibility.

Acknowledgements: The research was carried out at Universiti Teknologi Malaysia and funded by Higher education commission Pakistan.

GEO1003 - Birth Paroxysms of an Ocean: The Red Sea, the Levant Rift, and the Tectonics of Tiran Straits

Yossi Mart¹, John K. Hall² and Dina Vachtman^{3,*}

¹ *Leon Recanati Institute, University of Haifa, Haifa, 31905 Israel*

² *Geological Survey of Israel, Jerusalem, 95501 Israel*

³ *Geology Department, University of Manchester, Manchester, UK*

Abstract. During the geophysical exploration of the connection between the Red Sea and the Levant Rift, a precipitous submarine horst was encountered to underlie Tiran Strait, between the Sinai Peninsula and Tiran Island, but also between Hume Deep (1400 m) in northernmost Red Sea and Tiran Deep (1400 m), in the southernmost Levant Rift. The horst outcrops above sea level at the center of the strait, where corals built a series of small reefs known as Gordon Reefs. The horst forms a structural transfer zone between the Red Sea and the Elat ('Aqaba) Rift, trending NNE-SSW and constrained by a series of similarly-trending normal faults on both flanks.

Transfer zones were repeatedly encountered separating structural sinks, which, in both models and prototypes, appear along regional rifts, such as the grabens along the East African Rift and elsewhere, while similar structures were also observed in analog models. The evolution of transfer zones between grabens along axial rifts were attributed to oblique extension, where segments of the rift were offset laterally due to the obliquity of the extension. Consequently, the occurrence of the Tiran transfer zone could indicate that a geodynamic regime of oblique extension prevails in the northern Red Sea, and also exists in the Elat Rift. Furthermore, the Tiran horst is structurally associated with the arcuate system of grabens and elongated salt diapirs encountered in the bathyal northern Red Sea, which diverged from the Red Sea NNW-SSE orientation to the N-S trend of Elat Rift.

While the break-up of the Red Sea and the Suez Rift was dated to the middle Miocene, the age of the initiation of the rifting of Elat Rift, the southern segment of the Levant Rift, was attributed to late Miocene – early Pliocene, as indicated by mid-Miocene paleo-rivers that crossed the N-S trending rift from east to west. The age of the uplift of the flanks of the Elat Rift is indicated by an extensive series of parallel coralline terraces that rise more than 400 m above sealevel, and by the non-branching and concave profiles of the fluvial system, on Tiran Island. It seems that the northward propagation of the Red Sea ceased its Suez extension and selected the Elat Rift as its preferred route for continental break-up.

Since the Red Sea is considered an evolving young oceanic domain, its northern extension, the Levant Rift, seems a prime example of the earliest structural stage in the tectonic evolution of an incipient ocean. The present research did not encounter supporting evidence that the Elat Rift is a transform fault branching off from the Red Sea during the early-middle Miocene, nor that the Tiran Deep is a pull-apart basin.

GEO1054 - Spatio-temporal Variability of Precipitation Extremes and Drought Identification using Agro-Climatic Zones in the Mahi River Basin, India

Aditya Sharma¹, Devesh Sharma^{1,*} and S. K. Panda¹

¹*Department of Atmospheric Science, School of Earth Sciences, Central University of Rajasthan, NH-8, Bandarsindri, Kishangarh-305817, Ajmer, India*

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Abstract. Climate variability has received a great deal of attention worldwide. Examining the spatiotemporal dynamics of meteorological variables in the context of changing environment, particularly in region where rainfed agriculture is very significant in the management of watershed. To that end, spatio-temporal trend analysis has been employed to inspect the change of rainfall & drought characteristics using agro-climatic zone in the Mahi River basin, India. The Mahi basin covers three states i.e., Rajasthan, Madhya Pradesh, and Gujarat which is known for its substantial drought occurrences. Very limited studies have been carried out on drought assessment using agroclimatic zones at the basin level. Daily gridded rainfall data (0.25°×0.25° spatial resolution) for 51 grids from 1970 to 2019 has been taken from India Meteorological Department (IMD) to compute extreme precipitation indices and drought characteristics. The time-series non-parametric Mann-Kendall trend test was employed for trend analysis. Further, as per the agro-climatic zones, grid points are divided into three regions over the Mahi River basin. The region-wise agroclimatic rainfall variability has been analyzed using the rainfall anomaly index. The run theory was applied for the characterization of drought assessment. Standardized precipitation index (SPI) was determined for one, three, six, and twelve-month droughts. The result found a Consecutive dry day (CDD) with an increasing trend significantly and Consecutive wet days (CWD) with a decreasing trend may cause a possible impact on agriculture. Findings revealed that Central Plateau and Hills region recorded consequent frequent and maximum droughts events over the basin. Hence, the regional topography and moisture availability perform a major role in regional precipitation variability. The outcomes from the study would be utilized in a better understanding of the drought condition and give a better climate change indication at a regional-basin level for preparedness of effective management and planning of water resources in rainfed agriculture regions.

Keywords: Agro-climatic zones, ClimPACT2, Drought period, Extreme indices, SPI.

GEO1041 - Impacts of Land Use Change on Ecosystem Service Value of Qilian Mountain National Park in Gansu Area

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Abstract. As an important natural resource barrier in northwest China, Qilian Mountain National Park have a profound impact on the value of ecosystem services through rapid changes in land use patterns in Gansu Area. Based on the change law of land use and ecosystem service value (ESV) in Qilian Mountains (Gansu section) from 2000 to 2019, the FLUS model and EVS algorithm were used to set

up four scenarios of natural development, economic development, arable land protection and ecological protection, and the impact of land use change on ESV under different scenarios was simulated. The Remote Sensing Monitoring Dataset (CNLUCC) of land use land cover change in China provided by the Data Center of Resources and Environmental Sciences of Chinese Academy of Sciences analyzes land use change according to the first-level classification method of land use types in the system, namely arable land, woodland, grassland, water, construction land and unused land types. Using Logistic regression analysis to test the correlation between the selection factors and the change of land use type, four scenarios of natural development, economic development, arable land protection and ecological protection were set up with 2035 as the target year, and the total value of EVS under the four scenario models was analyzed. The results show that in four different study periods from 2000 to 2019, the land types of Qilian Mountain National Park (Gansu Area) have changed to varying degrees, mainly in the following aspects: the area of unused land continues to increase, the area of woodland, glacial snow and construction land fluctuates, and the area of arable land and grassland decreases. From the perspective of the total value of ecosystem services of land types, the total value of ecosystem services in Qilian Mountain National Park (Gansu Area) showed an overall increase-less change trend.

GEO1014 - Microorganisms in Mining Waste Remediation Technologies

Alok Prasad Das*

Department of life Sciences, Rama Devi Women's University, India

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Abstract. At present the world is facing enormous problems of mining waste pollution and unprocessed liberation of these toxic environmental pollutants. Mining heavy metal pollutants are considered as potential threats to the environment and all living organisms. The gradual depletion of natural resources and higher utilization rates has turned out to be a major universal concern in present situation. Microorganisms offers a substantial role in management of these toxic wastes without harming the environment through bioremediation of these metallic pollutants from their toxic to nontoxic forms. Microorganisms are exploited to recycle and recover precious minerals from mining waste residues and unprocessed liberations. Right now, microbial bioremediation technology is applied to recover minerals like gold, lead, copper, manganese, lithium, chromium and nickel from mining waste residues. Bioleaching technology in future will boost on commercial scale for scrubbing environmental contaminants and recovery of minerals from wastes.

Keywords: Mining, Waste, Microorganisms, Bioremediation, Management.

GEO1004 - Potential Impact of Sea Level Rise on the Geomorphology of Kuwait State Coastline

Ahmed Hassan^{1,*} and Mahmoud A. Hassaan²

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²*Human Geography and GIS, Institute of Graduate Studies and Research, Alexandria University, Egypt*

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Abstract. Sea-Level Rise (SLR) is one of the most severe risks threatening coastal zones all over the world. In Kuwait, coastal areas accommodate about 90 % of the total population and most of the urban area. Thus, SLR is expected to have significant impacts on Kuwaiti coastal areas, which may lead to changes in their ecosystems and the geomorphological units in the coastal area. This paper aims to assess the impacts of SLR on the geomorphology of the Kuwaiti coastline under two different scenarios of SLR: an integrated analysis model involving a variety of methods and a composite vulnerability index integrating five criteria. The results revealed that about 58% of the total coastal area is susceptible to inundation under 1 and 2 m SLR Scenario, whereas 8.3% of Kuwaiti coastal areas have moderate to high vulnerability levels. Moreover, it was found that SLR may have significant implications for some Kuwaiti coastal areas including expanding sabkhas areas, shoreline retreat, changing coastal hydrodynamics, and erosion patterns and accelerated weathering process. To avoid such potential impacts, it is essential to develop a national strategy for adaptation to SLR impact and mainstreaming adaptation into development plans.

Keywords: Sea-Level Rise (SLR), Coastal geomorphology, Climate changes, GIS, RS.

GEO1023 - Impact of the First Induced COVID-19 Lockdown on Air Quality in Israel

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Abstract. The coronavirus disease 2019 (COVID-19) induced a lockdown that has resulted in a sharp reduction in air and motor traffic and industrial activities. This in turn led to a reduction in air pollution around the world. It is important to quantify the extent of that reduction in order to estimate the weight of the impact of air and motor traffic and industrial activities over the total variation of air quality. An assessment of the extent of air pollution is aimed at facilitating the crafting of policies toward the reduction of pollution and the improvement in air quality. The aim of this paper is to evaluate the impact of the COVID-19 outbreak on air pollution in Israel. Particularly, we focus on Haifa and Greater Tel-Aviv (Gush-Dan), two regions with high air pollution, while examining different types of air monitoring stations. The period to which we refer to is March 8, 2020, to May 2, 2020. The results reveal two main findings: (1) During the COVID-19 lockdown, pollution emissions decreased relative to the same period in 2019. The biggest reduction was observed in NO_x, which, on average, was 41%. Surprisingly, ground-level ozone (O₃) increased, and appeared to behave similarly to the ozone weekend effect. (2) The total percentage variation in pollution emission that was explained by the lockdown was at most 26%. By adding the meteorological conditions (which included measures of

wind direction, wind speed, and temperature) as a factor in addition to the lockdown effect, this percent increased to 47%.

Keywords: Air pollution, COVID-19 lockdown, NO_x reduction, Linear regression ozone weekend effect.

GEO1053 - Diamonds and Dinosaurs: A New Model for Diamond Distribution in Brazil

Matt Forir and Don B. Hoover

The Missouri Institute of Natural Science, United States

Abstract. The region of interest is primarily in the central plateau of Brazil where most of the diamond and quartz deposits are located. The Bauru Basin, a subsidence basin formed by sinking of the very large Parana flood basalts, is the region where the eruptive units have killed a major number of Cretaceous life forms, probably from the sinking of massive amounts of carbon dioxide into lower elevations present within this basin. The eruptive carbonate source is probably the large Serra Negra alkaline body, in Minas Gerais, which has a crater approximately 10 km across, and contains two separate carbonate bodies within which have roots reaching through the crust. The remaining intrusive volume of Serra Negra was estimated, from gravity data, of some 1900 Km³. Assuming that the extrusive volume was much larger, this makes Serra Negra a Super Volcano.

Past work on the phase relations of calcite melts has shown that calcio-carbonatite melts are chemically unstable and will decompose, probably explosively, near the surface between 40 to 100 bars of pressure. The result of the phase change and corresponding explosion created large amounts of lime and CO₂ that formed surge deposits that drastically changed the landscape. Our research in Brazil has shown evidence for unusual mobilization of silica, and other elements, mostly in quartz veins, which have an unusual assortment of accompanying minerals. Much of the evidence for this mobilization is shown in near-surface vein deposits, scattered rather widely across Brazil, with much evidence found in early descriptions of deposits associated with the mining of diamonds and electrical quartz.

Dating of the eruption history is poorly known, much additional work is required. A mafic unit in the Serra Negra has been dated at 82Ma. Fossils, mostly from the Bauru in the Bauru Basin area indicate a time of 72 to 66 Ma when they were buried, and micro-paleontological studies show an 11 Ma hiatus between the Marilia and Ponta Alta facies in the Bauru. Crossbedding is often present within the Bauru, which we suspect is the result of surge deposition.

We now suspect that the quartz veins, known across a very wide part of the central plateau of Brazil, are a direct result of the eruption of massive amounts of carbonate magma, containing large quantities of entrained mantle rock. This was then deposited on the peneplained Pre-Cambrian surface which caps much of the Central Plateau. The alkaline environment created by the eruption increased the solubility of silica and other associated minerals which were later deposited in joints and faults. It is these quartz veins which have produced enormous quantities of fine hyaline quartz, for which Brazil is known, but also for supplying almost all the electrical quartz during WW2.

GEO1047 - Land Use and Local Environment Affect Macroinvertebrate Metacommunity Organization in Neotropical Stream Networks

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Abstract. Aim: Changes in land use and cover (hereafter land use) affect freshwater ecosystems at different spatial scales. We tested the effects of land use on the dispersal capacity of stream macroinvertebrates through local and regional processes. Location: In all, 183 Brazilian headwater stream sites, located in the Neotropical Savanna with variable land use and covering a total area of 46,394 km².

Methods: We used multiple regression models for distance matrices to identify the relative importance of environmental and landscape characteristics to explain community dissimilarity of stream macroinvertebrates with different mobility traits. As predictors, we calculated four distance metrics: environmental distance describing the dissimilarity in local conditions, the network distance accounting for distances across the drainage system and two distances measuring landscape resistance to dispersal (topographic and land use). We classified macroinvertebrates in dispersal groups according to their dispersal abilities (flying and drifting) and life story traits (voltinism, adult life span and body size). We tested the effects of these distances on all taxa and on the different dispersal groups, to explore whether biological traits would result in different metacommunity patterns.

Results: Our hierarchical clustering analysis identified five macroinvertebrate dispersal groups. The dispersal group 1 was mainly composed by aquatic obligate taxa, dispersal group 2 by taxa with low drift propensity, dispersal group 3 represented taxa with high directional flight capacity, dispersal group 4 included taxa with medium drift propensity and dispersal group 5 represented taxa with high drift propensity. We found that environmental distance and land use distance were the most important predictors explaining community dissimilarity for most of the dispersal groups.

Main conclusion: The metacommunity patterns found in this study suggest that environmental filtering was the most important community assembly mechanism at a local scale, whereas land use could constrain dispersal at the regional scale. Understanding these processes is crucial to meet conservation and restoration goals, especially in biodiversity hotspots. Our results reinforce the importance of

considering entire catchments for preserving stream health and aquatic biodiversity and indicate the need for a much more integrative research between terrestrial and aquatic ecology.

Keywords: Benthic invertebrates, Cerrado biome, Connectivity, Dispersal, Distance–decay relationships, Land use distance.

GEO1059 - Water Resources Development and Management in Estuaries during Astronomical Events

Soufiane Haddout

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GEO1062 - New Insights into the Shallow Aquifer Geometry and Saltwater Encroachment in the Chott El Jerid Region: Geoelectrical, Structural and Geochemical Approaches

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Abstract. The Neogene and the recent Quaternary series in the Southern Tunisian Atlas are characterized by deposition of an important clastic series, which are distinguished by contrasted lithological variations. The heterogeneity of these deposits is mainly due to the control of the tectonic activities. Therefore, these deposits are characterized as growth-strata as they were deposited during the most important tectonic events, which are responsible for the orogeny of most anticlines in Tunisia. Owing to their lithological heterogeneity, these growth-strata serve as a potential aquifer, which is known as the PQ shallow aquifer in the region of Chott El Jerid.

Geoelectrical, logging and geological data were used in conjunction to characterize the geometry of the Neogene and the Quaternary series in the Chott El Jerid region. The established isobath map illustrates significant variations in the depth of the aquifer level, which clearly reflect the tectonic control. In addition, the resistivity cross-sections show the existence of lenticular positive anomalous zones, which confirm their continental origin and characterize the lenticular geometry of the PQ aquifer. The isoresistivity map indicates a general decrease of the resistivity values from the recharge zone in the North (near the Tozeur anticline) toward the South (close to the Chott El Jerid). However, remarkable toes-shaped resistivity zones have been detected close to the Chott El Jerid, indicating a beginning of saltwater encroachment. On the other hand, a positive resistivity plume in the PQ aquifer has been identified, which may indicate an upward leakage of relatively fresh water ascending from

the underlying aquifer. These findings, together with the results of hydrochemical analyses, confirm the existence of saltwater encroachment into the PQ aquifer.

These results have been used to establish a conceptual model, which shows the impact of the overexploitation stress and the tectonic activity as well on the behavior of the electrical and hydrochemical facies of the PQ groundwater.

Keywords: Tectonic control, Growth-strata, Geoelectrical survey, Hydrochemical data, Saltwater encroachment.

Acknowledgements: I would like to warmly thank the organization committee of the 2022 International Conference on Geosciences and Remote Sensing (GeoRS 2022) for their invitation as a speaker in such an interesting event.

Oral Session 2: Geology

Time: 09:00-12:15, November 25, 2022. China Standard Time (GMT+8)

Session Chair: Dr. A K Sinha, CSIR- CSIR-Central Road Research Institute, India

Online Session Room Link: <http://www.academicconf.com/teamslink?confname=geors2022>

09:00-09:25 GEO1057	Three-Dimensional Multiple Shear Mechanism Model for Evaluation of Large-Scale Liquefaction Using High-Performance Computing <i>Dr. Muneo HORI, Research Institute for Value-Added-Information Generation, Japan Agency for Marine-Earth Science and Technology, Japan</i>
09:25-09:50 GEO1045	The Rivera Plate: A Small Oceanic Plate with Three Subduction Regimes <i>Dr. Román Alvarez, Universidad Nacional Autónoma de México, Mexico</i>
09:50-10:05 GEO1050	Geodiversity of Tata Aspiring Geopark: Role of Aerial Interference Hercynian Folds in the Geoeducation and Geotourism (Southern Morocco) <i>Dr. Sanae Berred, Tata Geopark Association, Morocco</i>
10:05-10:20 GEO1026	Characterization of Basin-Scale Dynamic Storage–Discharge Relationship Using Daily GRACE Based Storage Anomaly Data <i>Dr. Durga Sharma, Department of Civil Engineering, Indian Institute of Technology Hyderabad, India</i>
10:20-10:35 GEO1049	Optimization of Water Resources using Conjunctive Management Approach for Surface and Ground Water <i>Ms. Rabia Tabassum, Computer Science Department, National University of Computer and Emerging Sciences(FAST), Pakistan</i>
10:35-10:45	Coffee Break
10:45-11:05 GEO1021	Comparisons of U-Pb Ages of Triassic Detrital Zircons from the Nanpanjiang and Chuxiong Basin: Implications for the Triassic Tectonic Development of South China <i>PhD. Yi Shi, State Key Laboratory of Continental Dynamics and Department of Geology, Northwest University, China</i>
11:05-11:20 GEO1040	Validity and Reliability of the Declination Inclination Digital Station Instrument - a Comparison Qualitative Study <i>Mr. Ádám Domján, MinGeo Ltd., Hungary</i>
11:20-11:45 GEO1052	Stress-deformation and Performance Study of Jarofix Waste Material for Embankment Construction - A Case Study <i>Dr. A K Sinha, CSIR- CSIR-Central Road Research Institute, India</i>
11:45-12:00 GEO1030	Halokinesis in the Tunisian Central Atlas and Pelagian basin: Structuration and Petroleum Interest <i>Dr. Mohamed Abdelhamid GHANMI, Faculty of Sciences of Tunis, University of Tunis El Manar, Tunisia</i>
12:00-12:15 GEO1048	A Case Study on the Stability Analysis and Rockfall Assessment on A Massif at Risk, Mbankolo, Cameroon <i>Dr. Roger Bissaya, Department of Earth Sciences, University of Yaounde 1, Cameroon</i>

Abstracts of Oral Session 2

GEO1057 - Three-Dimensional Multiple Shear Mechanism Model for Evaluation of Large-Scale Liquefaction Using High-Performance Computing

Muneo HORI

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Abstract. A parallel finite element method (FEM) enhanced with high-performance computing capability is being developed for the numerical analysis of earthquake wave propagation and seismic structural response. A key feature of the parallel FEM is a liquefaction analysis that uses a multiple shear mechanisms model as nonlinear soil constitutive relation. In this presentation, briefly explaining the performance of the parallel FEM, we show a reproduction analysis of liquefaction experiments conducted on E-Defense, a large-scale shaking table in Japan. Constructing a three-dimensional numerical analysis model of high fidelity, we succeed to reproduce the observed porewater pressure and ground deformation. The practical usefulness and applicability of the parallel FEM are discussed, together with further improvements.

GEO1045 - The Rivera Plate: A Small Oceanic Plate with Three Subduction Regimes

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Abstract. The Rivera plate is a small oceanic plate that comes from the separation of Baja California from mainland Mexico; it is located between the northernmost portion of the East Pacific Rise and mainland Mexico; to the south the Rivera Fault Zone bound it. In an approximate length of ~650 km along the Mexican coast it shows three different subduction regimes: from its SE limit with the Cocos plate to Bahía de Banderas it shows subduction angles varying 50 to 60 degrees, the coastal section corresponding to Bahía de Banderas exhibits angles of nearly 90 degrees, and continuing to the NW, in the San Blas basin the subduction angle is of 26 degrees on average. The Cocos-Banderas section corresponds to the subduction process that has been active since around 80 Ma, whilst the other two were induced by the process of separation of Baja California from mainland Mexico, consequently operating since 8-10 Ma (Miocene). Bahía de Banderas is an indentation of 60 (E-W) by 30 (N-S) km in the Pacific littoral of Mexico, where depths of 1800 m are reached. The region where the subduction angle is nearly vertical is explained by a rollback of the oceanic plate, determined by gravity and magnetotelluric measurements; the low-angle subduction region to the NW is modeled with those type of data, plus seismic determinations. Bahía de Banderas is also the region in which a radical change in seismicity occurs between the region to the SE, where major seismic events have occurred (e.g., M=8.2) and many others of smaller magnitudes, and the San Blas basin to the NW where seismicity decreases sharply. In conclusion, the steeply dipping portion of the oceanic plate breaks up more often and with stronger effects than the region where subduction is flatter and cracking less frequent. The subduction rate of the Cocos-Banderas section has been estimated at 2.5 cm/yr.

Keywords: Rivera plate, Oceanic plate, Bahía de Banderas, San Blas Basin.

GEO1050 - Geodiversity of Tata Aspiring Geopark: Role of Aerial Interference Hercynian Folds in the Geoeducation and Geotourism (Southern Morocco)

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Abstract. One of the main characteristics of Tata aspiring geopark is the presence of interference folds which can be observed from space and using satellite images. This region of southern Morocco is part of the Anti-Atlas chain. The latter is characterized by a very heterogeneous ductile deformation, materialized by a phase of Hercynian folding and controlled by fractures of the Precambrian basement. It is a potential structural geomorphological object that illustrates the superposition of two generations of folds. The interference of these two folding phases is spectacular in aerial view. It represents a motif in the shape of a dome or basin, crescent or boomerang, belonging to the first and second type according to Ramsay's classification. This type of relief is able to attract more attention and curiosity from specialists and simple tourists, to admire and contemplate their shapes but also to understand their morphogenesis created by geodynamic processes. From these facts, it presents on the one hand a geoeducational interest for the researchers and on the other hand a geotouristic interest for the tourists.

Keywords: Tata, Morocco, Geodiversity, Aerial interference folds, Geoeducation, Geotourism.

GEO1026 - Characterization of Basin-Scale Dynamic Storage–Discharge Relationship Using Daily GRACE Based Storage Anomaly Data

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Abstract. Despite the fact that streamflow occurs mainly due to depletion of storage, our knowledge on how a drainage basin stores and releases water is very limited due to measurement limitations. A window of opportunity, however, is provided to us by GRACE (Gravity Recovery and Climate Experiment)satellite mission that provides storage anomaly (S_{an}) data. Many studies have explored a range of potential applications of S_{an} data such as flood forecasting. Here we argue that the capability

of GRACE satellite mission has not been fully explored as most of the studies in the past have performed analysis using monthly S_{an} data for large river basins. In this study, we use daily S_{an} data for several mid-sized catchments to perform storage–discharge analysis. Our results support the earlier notion that storage–discharge relationship is highly dynamic. Furthermore, we demonstrate that S_{an} data can be exploited for prediction of k of the Brutsaet–Nieber equation $-dQ/dt = kQ^a$ (Q is discharge at time t). For comparison we also use storage information provided by Catchment Land Surface Model (CLSM) as well as past discharge information to predict k . Our results suggest that GRACE based storage information can be used to predict k reasonably well in gauged as well as ungauged basins.

Keywords: Recession flow, Brutsaet–Nieber equation, GRACE derived total water storage anomaly data, Dynamic storage–discharge relationship.

Acknowledgements: The authors would like to thank Ministry of Human Resource Development (MHRD), India, for funding Durga Sharma’s doctoral research. We would also like to acknowledge that a portion of this work was conducted at the Jet Propulsion Laboratory, California Institute of Technology, under contract with NASA. We thank three anonymous reviewers for providing us very valuable comments and suggestions, leading to a significant improvement of the paper.

GEO1049 - Optimization of Water Resources using Conjunctive Management Approach for Surface and Ground Water

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Abstract. Many regions of the world have reached a point at which present water resources are already being over-used, as indicated by the depletion of groundwater aquifers and rivers. Pakistan, one of the world’s most water-stress developing countries, categorize as a water-scarce country. To achieve sustainable urban development and to reduce energy, alternate water resources become essential. The surface and groundwater conjunctive use is an integrated management system in terms of quantity and quality to achieve sustainability. Conjunctive management can solve water scarcity problems by using water efficiently.

This research work investigates the conjunctive use of surface and groundwater for DHA City Karachi, Pakistan, in the longer run. The study first estimates the water demand on temporal and spatial bases for the study area. A water demand reduction framework is developed for wastewater reuse and water-efficient fixture installation. Assessment and harvesting of the stormwater resources using watershed modeling and water reservoir analysis are done. For integrated conjunctive water modeling, the water balance approach provides a sustainable model that gives a better solution for the water resource of the newly planned city.

Keywords: Water resource, Surface water, Ground water, Conjunctive management, Water demand.

GEO1021 - Comparisons of U-Pb Ages of Triassic Detrital Zircons from the Nanpanjiang and Chuxiong Basin: Implications for the Triassic Tectonic Development of South China

Yi Shi

State Key Laboratory of Continental Dynamics, and Department of Geology, Northwest University, Xi'an 710069, China

Abstract. The Triassic closure of eastern branches of Paleo-Tethyan ocean and associated back-arc basins set the stage for development of a huge composite continent of eastern and southeastern Asia. During this time, the tectonic development of South China was featured by the huge scale intracontinental deformation and associated magmatism. Two main competing perspectives for the driven mechanism of intracontinental tectonics of South China are subsequent continental collision following the closure of Paleo-Tethys and the subduction of paleo-Pacific plate underneath southeastern China. The Nanpanjiang basin, located in the convergence area of the Paleo-Tethys and paleo-Pacific tectonic domains, is regarded as the key to test these perspectives. However, there are different explanations for the evolution of Nanpanjiang basin, including a foreland basin related to the collision between the South China and Indochina blocks or flat subduction of the paleo-Pacific plate, or a back-arc extensional basin associated with northwestward subduction of the paleo-Pacific plate. The Chuxiong basin, located on the west side of Nanpanjiang Basin, develops similar tectonostratigraphic sequence with the Song Da basin that situates in peripheral region of Indochina orogenic belt, and it has been proven to be a representative indosinian foreland basin in southwestern South China block. We applied detrital zircon U-Pb dating analysis to Triassic sedimentary rocks from Nanpanjiang and Chuxiong basin. Both marine and terrestrial samples from Nanpanjiang basin exhibit an overall similar detrital zircon U-Pb age distribution pattern with major age groups at ca. 200-300 Ma, ca. 320-380 Ma, ca. 400-500 Ma, ca. 850-1000 Ma, and ca. 1750-1900 Ma. While the age spectrum in Chuxiong basin shows different age interval distributions: Marine strata in lower part are characterized by a single peak at 350-200 Ma and the multi-peaked age distribution concentrated on 350 – 200 Ma, 500 – 400 Ma, 900 – 700 Ma, 2000 – 1750 Ma and 2600 – 2350 Ma; The continental deposits in middle part dominated at a major peak at 900 – 700 Ma; The age spectrum of continental samples in upper part from the western part is consistent with the multi-peaked-age distribution of lower marine deposits, and the zircons from eastern basin show the similar single-peaked pattern with middle terrestrial sediments in the western basin, respectively. Therefore, the Nanpanjiang Basin shows different detrital zircon provenance composition compared with the Chuxiong Basin. Combined with the existing paleocurrent data and spatial distribution characteristics of sedimentary system, the Triassic provenance of Nanpanjiang basin mainly came from a continental marginal arc associated with the convergent plate boundary of southern China, and the Triassic zircons of Chuxiong basin mainly derived from Ailao Shan orogenic belt and northern Kangdian basement. The uncertainties of tectonic context for subduction-related eclogite, the absence of magmatic rocks and Triassic unconformities which are found on the west side of the Ailao Shan–Red River shear zones in South China, and an extensional basin interpretation for Nanpanjiang basin, all representing a challenge for the widely accepted collisional model of Indosinian movement. Considering the Triassic arc magmatism associated with subduction of oceanic plate in Cathaysian margin, together with the early Paleozoic and Triassic magmatic rocks in South China block and an overprinting relationship between

Triassic and early Paleozoic structural deformations, we propose that the Triassic intracontinental tectonic evolution in South China was controlled by the subduction of the paleo-Pacific plate.

GEO1040 - Validity and Reliability of the Declination Inclination Digital Station Instrument - a Comparison Qualitative Study

Ádám Domján^{1,*}, László Hegymegi¹, Csaba Hegymegi¹ and György Máté Vereb¹

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Abstract. Absolute geomagnetic measurements are performed using a single component fluxgate magnetometer mounted on a nonmagnetic theodolite, known as Declination Inclination Magnetometer (DIM).

At MinGeo company recently we developed a push button DIM instrument, named as Declination Inclination Digital Station (DS), which gives all necessary measurement data in digital form. Optical angle reading system replaced with digital angle encoder, the magnetometer is fixed on the telescope and its output together with D and I angle are sent to a tablet via Bluetooth. For time stamp the GPS information of the tablet is used. All measurement data are stored and displayed by the tablet. There is a possibility to connect a scalar magnetometer to the DS as well. The data recording initialized by a remote controller. All these features make easier and faster the measurement. At the end of measurement session all data can be downloaded in xls or csv format.

In this presentation we give a brief introduction about the capabilities of our new DS instrument and demonstrate the validity and reliability of the DS device.

We share with you the comparison measurement results between our DS and a reference classical DIM instrument. We show that absolute measurements of DS instrument meet the ± 2.5 nT newly adopted baseline accuracy confidence limit of the INTERMAGNET specification.

Keywords: Absolute magnetic measurement, Declination inclination magnetometer, Geomagnetic field vector, Instrument comparison, Validity, Reliability.

GEO1052 - Stress-deformation and Performance Study of Jarofix Waste Material for Embankment Construction - A Case Study

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Abstract. Jarofix is a waste material generated during the extraction of zinc from its ore. At present, the accumulated jarofix is about 65 million tons, while the annual production is about 3 million tons

in India. This waste material is dumped near the producing plant and has no application at present, creating environmental problems also. Literature review indicates that it has potential for road construction but very limited basic research has been carried out so far on it. The material was investigated in the laboratory and field to study its stress-strain behaviour. A detailed laboratory test was carried out to determine the physical, chemical, and geotechnical characteristics. Jarofix was mechanically (25 - 75 %) and chemically (3 - 9 %) stabilized with local soil and cement respectively. A series of laboratory direct shear tests on jarofix specimens was carried out at different normal stresses (25 to 150 kPa) and dry densities (90 to 100 % MDD) simulating with field conditions. Stress ~ strain and dilatancy behaviours were discussed in detail. Stress–deformation behaviour was studied under different loading conditions by varying the edge distance, slope, and width of strip footing in a laboratory small-scale physical model. The stress–deformation behaviour was also studied by reinforcing the model jarofix embankment with geogrid reinforcement. To study the actual behaviour of jarofix material in the embankment, an experimental test section was constructed along Udaipur-Chittaurgarh State Highway, Rajasthan, India where highway was upgraded from two lanes to four lanes. Jarofix was used alone and also mixed with soil in the proportion of 50:50. In situ mixing of jarofix and soil was carried out by (1) tractor-towed disc (2) tractor-towed harrow and (3) grader. Three years performance of embankment was studied through a collection of different data viz. pavement surface condition, structural & functional parameters and settlement at different interval of time. It was inferred that jarofix alone and mixed with soil may be used for the construction of an embankment.

Keywords: Jarofix, Waste, Embankment, Characterisation, Road, Performance.

Acknowledgements: Director, CSIR-Central Road Research Institute, New Delhi, India.

GEO1030 - Halokinesis in the Tunisian Central Atlas and Pelagian basin: Structuration and Petroleum Interest

Mohamed Abdelhamid GHANMI^{1,*}, Adel ZAAFOURI², Ali CHAIEB³, Mohamed GHANMI¹

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Abstract. Studying and understanding halokinetic process is highly important for both academic research and oil industry because of the complex geometry and its associated trapping process. This study aims to better analyze and understand halokinetic structures along Tunisian Central Atlas (Maknassy-Mezzouna region) to the pelagian block (Gulf of Gabes).

This study tends to diagnose the relationship between halokinesis, sedimentation and tectonics.

Effects of halokinesis on the structuration of the studied domain will be highlighted. Here, we deal with the petroleum interest of the halokinesis process which can play a key role in the hydrocarbon exploration in both Tunisia and North Africa in a large scale.

To attain these objectives, we were based on field, seismic and petroleum well data.

GEO1048 - A Case Study on the Stability Analysis and Rockfall Assessment on A Massif at Risk, Mbankolo, Cameroon

Roger Bissaya^{1,*}, Robert Eko Medjo¹, Bernard Njom¹ and Richard Tanwi Ghogomu¹

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Abstract. Slope and underground stability researches seem to converge towards the joint parameters, from where it is common to identify mass movement weaknesses. This contribution aims to address the stability analysis and rockfall assessment from Mbankolo rocky hill based on geo-structural characterization and discontinuous deformation analysis (DDA). DDA provides rigorous processes to analyse or assess rock stability under gravity as the main force. (1) The main joint sets were defined (F1, F2, and F3), and the subsequent free planes and key-block diagrams were generated. Thereafter the kinematic analyses were processed. They revealed that, the stable blocks are non-removable or removable. According to the joint sets geometry and block boundary conditions, the removable blocks which intersect the slope become potential or key. However, the most likely failure mode is that of primary and secondary key-block patterns; i. e. when the primary key-block is removed, the adjacent block, which is originally non-removable (tapered), could become removable. (2) Key-block diagrams were assigned to sectors of specific occurrence frequencies. This resulted in a hazard zone map which can be useful in mitigation of the risk. We found useful to undertake a three-dimensional modelling control to better address the accuracy and reliability of this work. The slope models yield stable, potential, and key blocks which might fall with no sufficient fictitious force similarly to DDA results. The misleading in this work may come from over-simplification of the geometry of discontinuities and slopes, and the missing of some triggering factors.

Keywords: Discontinuity, Block theory, Modelling, Mbankolo, Cameroon.

Oral Session 3: Remote Sensing

Time: 14:30-17:25, November 25, 2022. China Standard Time (GMT+8)

Session Chair: Dr. Marchetti Dedalo, Jilin University, China

Online Session Room Link: <http://www.academicconf.com/teamslink?confname=geors2022>

14:30-14:45 GEO1044	Providing a Desired Compression Ratio for BPG Encoder of Color Images: Design and Analysis <i>Ms. Fangfang Li, Key Laboratory of Opto-Electronic information Science and Technology of Jiangxi Province, Nanchang Hangkong University, China</i>
14:45-15:00 GEO1027	Error Analysis on the On-orbit Calibration for the MERSI in the TEB Caused by the Pixel Response Value <i>Ms. Yue Huang, Qingdao University of Science and Technology, China</i>
15:00-15:15 GEO1035	FPGA Realization of Complex Logistic Map Fractal Behavior <i>Mr. Bahaa M. Abo-AlNaga, Scalable Energy-Efficient Computing Laboratory (SCALE), Brown University, United States</i>
15:15-15:30 GEO1031	Remote Sensing of Atmospheric Compositions based on Ground-based High-Resolution Fourier Transform Infrared (FTIR) Spectrometry <i>Dr. Hao Yin, Key Laboratory of Environmental Optics and Technology, Anhui Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, China</i>
15:30-15:55 GEO1013	Study of Parameters in Dictionary Learning Method for Seismic Denoising <i>Dr. Lakshmi Kuruguntla, Department of Electronics and Communication Engineering, SRM University, India</i>
15:55-16:05	Coffee Break
16:05-16:20 GEO1008	Thunderstorm/Lightning Hazards and Ionospheric Perturbations <i>Dr. Sanjay Kumar, Department of Physics, Banaras Hindu University, India</i>
16:20-16:45 GEO1046	Flash Flood Susceptibility Analysis in the District of Chitral by the GIS-Based Morphometric Ranking Approach <i>Mr. Waqas Ahmad, IGIS, National University of Science and Technology, Pakistan</i>
16:45-17:00 GEO1038	Automatic and Remotely Controlled Manual Absolute Geomagnetic Measurements with the ADS Instrument <i>Mr. László Merényi, Mingeo Ltd., Hungary</i>
17:00-17:25 GEO1058	Hydrocarbon Reservoir Visualization/Modeling using ArcGis and Well Logging Data: Alif Reservoir, Marib-Shabwa Basin as a Case Study <i>Dr. Mohammed Albaroot, Faculty of Sciences, Saba University Region, Yemen</i>

Abstracts of Oral Session 3

GEO1044 - Providing a Desired Compression Ratio for BPG Encoder of Color Images: Design and Analysis

Fangfang Li¹ and Vladimir Lukin²

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Abstract. In this paper, we consider a task of providing a desired compression ratio (CR) in lossy compression of color images by better portable graphics (BPG) encoder. The problem consists in the fact that this encoder, on the one hand, produces certain benefits compared to other modern image compression techniques in the sense of better quality for the same CR, but, on the other hand, CR for a given value of a parameter Q that controls compression in BPG can vary in very wide limits depending on image content. Since a recently proposed two-step method of providing a desired quality of compressed images based on average rate-distortion curves has recently demonstrated its high efficiency and accuracy acceptable for many practical applications, we analyze the applicability of this approach to providing a desired CR. It is shown that the accuracy of providing a desired CR characterized by variance for a set of test images improves radically after the second step compared to the first step parameters, which are determined by the average dependence of CR on Q. Variances of original (after the first step) and provided (after the second step) also depend on a desired CR and they are larger for the larger desired CR. The influence of residual errors in the provided CR on image quality is studied as well.

GEO1027 - Error Analysis on the On-orbit Calibration for the MERSI in the TEB Caused by the Pixel Response Value

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Abstract. The remote sensor mounted on the Fengyun-3C (FY-3C) will decay naturally during the operation, causing a decrease in the accuracy of the satellite data. Therefore, an effective monitoring method must be adopted to study the performance changes of the instrument. The theoretical expressions of the absolute and relative errors for the earth field of view (FOV) radiance together with its equivalent brightness temperature are given by analyzing the response value offsets of the earth FOV along with the blackbody (BB) pixel. In order to further describe the influences of different parameters on the absolute and relative errors for the FOV radiance and equivalent brightness temperature, the computer simulations are performed, and the absolute errors for the FOV radiance and equivalent brightness temperature caused the response value offset of the BB pixel firstly decrease and then increase with the increasing of the earth FOV response value. The absolute and relative errors for the FOV radiance caused the response value offset of the earth FOV firstly decrease and then

increase, and the absolute error for the equivalent brightness temperature increases while its relative error decreases with the increasing of the response value of the earth FOV. This research provides an important theoretical guidance for improving the on-orbit performance of the FY-3C/ MERSI.

GEO1035 - FPGA Realization of Complex Logistic Map Fractal Behavior

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Abstract. This paper studies the capability of digital architecture to mimic fractal behavior. As chaotic attractors realized digitally had opened many tracks, digital designs mimicking fractals may ultimately achieve the same. This study is based on a complex single-dimensional discrete chaotic system known as the generalized positive logistic map. The fractals realized from this system are linked to the results of the mathematical analysis to understand the fractal behavior with different variations. A digital hardware architecture manifesting the fractal behavior is achieved on FPGA, showing a fractal entity experimentally. With this digital realization, it is hoped that fractals can follow the example of chaotic attractors digital applications.

GEO1031 - Remote Sensing of Atmospheric Compositions based on Ground-based High-Resolution Fourier Transform Infrared (FTIR) Spectrometry

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Abstract. The ground-based Fourier Transform infrared (FTIR) spectrometry can capture the direct solar spectra, which can avoid the influence of the atmospheric scattering process. Based on the nonlinear least squares retrieval algorithm, i.e., Optimal estimation algorithm, we retrieved numerous atmospheric compositions such as stratospheric nitrogen dioxide (NO₂), hydrochloric acid (HCl), formaldehyde (HCHO), ethane (C₂H₆) and Hydrogen Fluoride (HF), et al., by high-resolution FTIR spectra, and obtained the time series of the concentrations of these compositions, over Hefei, China. For stratospheric NO₂, HCl, C₂H₆ and HCHO, the retrieval micro windows are focus on mid-infrared solar spectra suites and the retrieval setting are following the NDACC standard recommendations. For HF, both near-infrared (NIR) and mid-infrared (MIR) solar spectra suites, which are recorded following the requirements of Total Carbon Column Observing Network (TCCON) and Network for the Detection of Atmospheric Composition Change (NDACC), respectively, are used to retrieve the concentrations of HF. We analyzed the seasonal cycle and inter-annual variabilities of each atmospheric compositions. The seasonal cycle of HCl, C₂H₆ and HF showed higher values in winter, and lower values in summer. Furthermore, the maximum values are occurred in summer, and minimum values are occurred in winter for HCHO, and stratospheric NO₂. The inter-annual variabilities present positive trend of $(2.38 \pm 0.71) \text{ \%}/\text{year}$, for HCHO. However, there are negative trends of $(-0.34 \pm 0.05) \text{ \%}/\text{year}$, $(-1.83 \pm 0.13) \text{ \%}/\text{year}$, $(-2.60 \pm 1.34) \text{ \%}/\text{year}$, and $(-0.38 \pm 0.22) \text{ \%}/\text{year}$ for stratospheric

NO₂, HCl, C₂H₆, and HF, respectively. The FTIR retrievals are also applied to evaluate the accuracy of satellite remote sensing and atmospheric chemistry transport model.

Keywords: Remote sensing, FTIR, Retrieval, Atmospheric compositions, Environmental optics.

Acknowledgements: This research has been supported by the National Key Research and Development Program of China (Grant NO. 2019YFC0214802), the Youth Innovation Promotion Association, CAS (Grant NO. 2019434), and the Sino-German Mobility Programme (Grant NO. M-0036).

GEO1013 - Study of Parameters in Dictionary Learning Method for Seismic Denoising

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Abstract. In seismic data processing, denoising is one of the important steps to get the earth subsurface layers' information accurately. The Dictionary Learning (DL) method is one of the prominent methods to denoise the seismic data. In general, DL is used to represent the data in sparse domain with few numbers of atoms from an overcomplete dictionary. The sparse domain captures the required features from the data and separates the noise. There are two important steps involved in DL method namely sparse coding and dictionary update which are performed iteratively on the input noisy data. In sparse coding, the dictionary is known priori and sparse coefficients are obtained by solving the cost function with respect to sparsity and error constraints. Similarly, in dictionary update, the sparse coding coefficients are fixed and the dictionary is only updated. In both sparse coding and dictionary update, various parameters play a key role to denoise the seismic data accurately. The important parameters involved in DL are patch size, dictionary size, number of training patches, choice of threshold, sparsity level, computational cost and number of iterations for dictionary learning, etc. In this work, we analysed each parameter and its effects on seismic denoising in terms of signal-to-noise ratio and mean square error between the true and denoised seismic data. We examined the performance of the DL method on synthetic and field seismic data for various choices of parameters.

Keywords: Dictionary learning, Denoising, Parameters.

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GEO1008 - Thunderstorm/Lightning Hazards and Ionospheric Perturbations

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Abstract. A thunderstorm is a localized electrical storm accompanied by lightning and thunder. They normally lead to local atmospheric instability, and just a single thunderstorm can produce lightning, catastrophic flooding, tornadoes, very strong winds, and hail. A thunderstorm is known to be produced by convective activity which help to rise warm air and produce atmospheric instability. In present paper attempt has been made to study atmospheric/ionospheric perturbation during thunderstorm activity and associated coupling processes. Convective activity produces atmospheric gravity waves (AGWs) which propagates up to the ionosphere and influences electron density distribution there, is also discussed. Plasma bubbles along with scintillation activity of different characteristics than normal have been observed during thunderstorm period attributed to AGWs generated during thunderstorm which may trigger the Rayleigh Taylor instability and hence the formation of plasma bubbles.

Keywords: Thunderstorm hazards, Atmospheric gravity waves, Atmospheric-ionospheric perturbation.

GEO1046 - Flash Flood Susceptibility Analysis in the District of Chitral by the GIS-Based Morphometric Ranking Approach

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Abstract. Flash flooding is one of the most dangerous natural disasters that occurs frequently in the District of Chitral, Khyber Pakhtunkhwa, in Pakistan. In this study, the morphometric approach was used to assess the intensity of flood risk at 22 sub-watersheds in Chitral. The assessment was conducted by using remote sensing and GIS techniques. The digital elevation model was utilized to delineate watershed networks. A total of 15 morphometric parameters were used for flash flood modelling. The Morphometric Ranking Approach (MRA) suggests that B7, B9, B12, and B17 have high susceptibility, B2, B3, B5, B 6, B13, B16, and B22 have moderate susceptibility, and B1, B4, B6, B10, B11, B14, B15, B18, B19, B20, B21 have low flash flood susceptibility. The results of this study help implement appropriate remedial measures to mitigate the impacts of potential flash floods in the District of Chitral.

Keywords: Morphometric analysis, Flash flood, Watershed delineation, Drainage basin area.

GEO1038 - Automatic and Remotely Controlled Manual Absolute Geomagnetic Measurements with the ADS Instrument

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Abstract. A new instrument, called Automated Digital Station (ADS), have been developed which can perform absolute geomagnetic declination and inclination measurements automatically and also in a remotely controlled manner. With this instrument, absolute measurement will be possible at places where the presence of an operator can hardly be ensured.

ADS is based on the Zeiss nonmagnetic theodolite, which is equipped with a single axis magnetometer on the top of the telescope. This instrument is widely used by the conventional manual absolute measurements. In ADS, two nonmagnetic piezoelectric motors, two digital angle encoders and a custom made, low magnetic digital camera are built in the theodolite. With these extensions there is no need any more for an operator at the instrument, to perform absolute observations. The operator can remotely rotate the telescope and alidade, can read out magnetometer output and angle data and can measure the angles of the mark direction recorded by the camera through the telescope. In addition, a controller hardware and software have been developed, that can automatically perform the absolute measurements, continuously or by pre-programmed timing schemes. The realised and tested automatic measurement programs include the conventional null method and also, some new experimental methods. A null method measurement is executed within about 23 minutes by the ADS, while the fastest experimental method needs only about 8 minutes to complete. This short measurement time makes the instrument suitable to measure during highly active periods.

The controlling software includes a digital image processing algorithm, which can detect the direction of the mark on the images taken by the camera.

We present the results of the test measurements taken by ADS. All the calculated spot baseline values of ADS instrument accomplished to the ± 10 nT confidence limit. Moreover, 90% of the data lies inside the ± 5 nT band. We are convinced that with some further improvements, ADS will meet the ± 2.5 nT band, that is the newly adopted baseline accuracy limit of the INTERMAGNET specification.

The system works with 12Vdc power supply. GPS time is used for time stamps. The controller and data collection platform gives also connection possibility to a scalar absolute magnetometer and to a three-component vector magnetometer. Because of the low power consumption of ADS instrument, it can be operated from reasonably sized solar power systems.

Keywords: Geomagnetic observatory, Absolute geomagnetic measurement.

GEO1058 - Hydrocarbon Reservoir Visualization/Modeling using ArcGis and Well Logging Data: Alif Reservoir, Marib-Shabwa Basin as a Case Study

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Abstract. Subsurface reservoir modelling is a complex task for geographic information system (GIS) technology. However, the spatial nature of geo-objects always drives GIS to be part of the modelling systems. The traditional activities in which GIS is involved in geosciences are data management, visualization, spatial analysis, and decision support. Current developments allow the full GIS capabilities on a desktop computer with full integration of the industry-standard relational database management system (RDBMS), geostatistical functionality, 3D visualization, 3D geoprocessing capabilities, and Web-based mapping. These make GIS more attractive for comprehensive geosciences needs. Modern GIS is built on an open standard technology that ensures GIS can be integrated with specialized solid 3D geosciences programs to solve complex geologic problems. Recent advances in interoperability and standards, in addition to the breakout of GIS from a specialist application toward being a widespread desktop tool, have meant that it is now in an ideal position to provide a powerful data integration tool in many industries. Industries, such as meteorology, environmental management, or oil and gas, deal with complex three-dimensional spatial data. To provide full integration, GIS must handle complex three-dimensional data types and spatial representations that exist in the various disciplines within these industries. This paper introduced the main modelling procedure, the stages of modelling of hydrocarbon reservoir using ArcGis. Schlumberger's petrophysical analysis software Techlog was chosen because it is widely used and Windows based. Techlog uses "Wire line logs" in its petrophysical properties analysis, which allow the user to define tabulated data throughout a solid structure. These tabulated data are composed of top and bottom of reservoir, gross (thickness), effective porosity, shale volume, and fluid saturation (water and hydrocarbon saturation). As an innovation point, this paper explored the technological realization of the transplantation of the 3D model between the Techlog software and the ArcGis software for the first time for Alif reservoir in Marib-Shabwa basin and achieved perfect effect. At last, the Alif member case study indicated that ArcGis could quickly build reservoir model for all the petrophysical properties derived from well log data and presented it in 3D visualization theme.

Keywords: Subsurface modelling, 3D reservoir visualization, Petrophysical properties, Well logging, Alif reservoir, Marib-Shabwa Basin, Yemen.

Part IV Poster Session

Online Poster Presentation Guidelines

-  **Poster Presentations:** A collection of posters in PDF format (with/without audio) are available at conference website for attendees to view.
-  **Poster Q&A:** Attendees could type the questions in the chatbox on MS Teams or leave questions in the notebbox below the posters on the conference page. Presenters will answer the questions as soon as they can.
-  Signed and stamped electronic presentation certificate would be issued via e-mail after conference.

List of Posters

Time: 11:50-12:20, November 24, 2022. China Standard Time (GMT+8)

Online Session Room Link: <http://www.academicconf.com/teamslink?confname=geors2022>

**Should you have any questions on the online posters, please feel free to write down in the chatbox in MS Teams, or you can write down your comments in the notebbox of each poster at GeoRS 2022 official website. The organizer will forward your questions to the presenters.*

GEO1002	Use of Multiple Fixed Base Stations to Correct Geolocalization Data of Photographs in UAV Photogrammetry Projects <i>Dr. Patricio Martínez-Carricondo, Department of Engineering, Mediterranean Research Center of Economics and Sustainable Development (CIMEDES), University of Almería, Spain</i>
GEO1018	Cosmological Implications in f(P) Gravity <i>Dr. Zoya Khan, Department of Mathematics, COMSATS University Islamabad, Lahore-Campus, Pakistan</i>
GEO1019	Structural Height, Amplification and Damage During the Superficial Earthquakes at Casamicciola Ischia (2017) and Santa Venerina Catania (2018) Italy <i>Dr. Marco Gatti, Department of Engineering, University of Ferrara, Italy</i>
GEO1028	Research on Surface Debris Flow Sensitivity Evaluation Based on RS and GIS in Dongchuan County <i>Ms. Yu Hui, Zhejiang Institute of Surveying and Mapping Science and Technology, China</i>
GEO1032	Research on Retrieval of Sulfur Dioxide in Volcanic Region from EMI- II <i>Dr. Yuanyuan Qian, Key Laboratory of Environmental Optics and Technology, Anhui Institute of Optics and Fine Mechanics, Hefei Institutes of Physical Science, Chinese Academy of Sciences, China</i>
GEO1033	Analysis of Vertical Distribution of Stratospheric Ozone Based on Weighted Multiply Algebraic Algorithm <i>Dr. Ziqiang Xu, Key Laboratory of Environmental Optics, Anhui Institute of Optics and Fine Mechanics, Hefei Institutes of Physical Science, Chinese Academy of Sciences, China</i>

Abstracts of Posters

GEO1002 - Use of Multiple Fixed Base Stations to Correct Geolocalization Data of Photographs in UAV Photogrammetry Projects

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Abstract. Unmanned aerial vehicles (UAVs) equipped with global navigation satellite system Real Time Kinematic (GNSS RTK) receivers are becoming increasingly common in surveying work. This equipment allows direct georeferencing of the photogrammetric project without the need to use ground control points (GCPs), which represents a significant advance in terms of time savings and safety for the operator. However, when exporting the point cloud after the photogrammetric process, significant errors have traditionally been observed in the elevation data due to poor determination of the camera calibration parameters. Previous research suggests that using ground control points (GCPs) or even oblique photographs significantly improves the results obtained. Our research has shown a complementary way to improve the accuracy of the elevation data, consisting of averaging the geolocation data of the photographs obtained by the UAV from the differential corrections from two fixed bases. The results show how this procedure improves the altimetric accuracy of the point cloud without the need to use GCPs or oblique photographs. The errors achieved are even below the ground sample distance (GSD) of the photogrammetric project. In addition, the total errors obtained with this methodology are similar to those obtained with different combinations of various GCPs.

Keywords: UAV, Photogrammetry, RTK, PPK, Direct georeferencing, Multiple fixed base stations.

Acknowledgements: This work was supported by the Grant for Bridge Projects of the Plan for Research and Transfer 2021 of University of Almería (PPUENTE2021/003).

GEO1018 - Cosmological Implications in $f(P)$ Gravity

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Abstract. In the framework of $f(P)$ gravity, we examine the nature of cosmological parameters by choosing different models of $f(P)$ gravity at past, present as well as future epoch for Hubble parameter from parameterized deceleration parameters. It is found that equation of state parameter leads to quintessence behavior and its ranges lie within Planck data for different constraints. We also study the squared sound speed and the thermodynamics for specific choice of constants. The squared sound

speed corresponds to the viable results. Similarly, the validity of GSLT is also investigated for both linear and nonlinear models of $f(P)$ theory. However, the thermal equilibrium condition holds for both $f(P)$ models for specific choice of constants.

GEO1019 - Structural Height, Amplification and Damage During the Superficial Earthquakes at Casamicciola Ischia (2017) and Santa Venerina Catania (2018) Italy

Marco Gatti

Department of Engineering, University of Ferrara, Italy

Abstract. The earthquakes at Casamicciola Isola di Ischia of 21 August 2017 and Santa Venerina Catania of 26 December 2018 were studied to determine if damage caused to buildings was attributable to a relation between dynamic amplification of the ground and structural heights typical of the local construction. Initially we used the accelerometric recordings of some seismic stations near the epicenters, obtaining the dynamic amplification factors for buildings constructed in reinforced concrete and masonry. Then, about 200 buildings belonging to several localities near these stations were surveyed with regard to the structural heights H , construction materials and characteristics, and damage suffered. From the geometric relation between a building's elastic period of vibration T and its height H , it was determined that the second story had the highest dynamic amplification. The results showed maximum dynamic amplification factors of 3 for reinforced concrete buildings and 2.4 for masonry buildings, while the greatest damage was found in two-story buildings, i.e. those with the highest dynamic amplification, confirming the above-mentioned relation. The theoretical basis of the study can be extended to similar contexts in order to signal vulnerable conditions of a building or to define a rapid method for the detection of small-scale seismic risk.

Keywords: Dynamic amplification factor, DAF, Height, Damage, Earthquake, Seismic risk.

GEO1028 - Research on Surface Debris Flow Sensitivity Evaluation Based on RS and GIS in Dongchuan County

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Abstract: Sensitivity analysis about small watersheds is an important way to objectively understand the development characteristics of debris flow ditches. With the support of GIS and RS technologies, Dongchuan County was selected as the research object, and the Landsat image and DEM data were used to interpret the small watersheds on both sides of the Xiaojiang River. By selecting four indicators of fault zone, slope, gully density and land use as the impact factors, the sensitivity coefficients was quantitatively calculated. The following research results were obtained: The distribution feature of

debris flow small watersheds was that the Dongchuan fault zone was the axis, which small watersheds were symmetrically distributed on; The sensitivity of the Dongchuan fault zone was the highest in the buffer distance of 5-10 km, which was prone to debris flow disasters; The debris flow was most sensitive in the slope range of 40°-50°; The debris flow was most sensitive to the gully density of 0.6-0.9 km/km² with broken surface; Three types of land use such as bare land, water and construction land had high sensitivity coefficient and were easy to cause mountain disasters. According to the sensitivity coefficients of the above impact factors, the stacking method superposition analysis was carried out to obtain the sensitivity distribution of debris flow disasters in Dongchuan County. The medium sensitive area accounted for 53.84% of the total area, and the high sensitive area accounted for 27.02% of the total area. The medium sensitive area and the high sensitive area were the main areas where debris flow occurred. This study has certain reference significance for disaster prevention, soil and water conservation by quantitative calculation and comparison of debris flow disaster sensitivity.

Keywords: debris flow, sensitivity, fault zone, slope, gully density, land use, Dongchuan County

GEO1032 - Research on Retrieval of Sulfur Dioxide in Volcanic Region from EMI-II

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Abstract. SO₂ not only affects human health (such as acid rain, respiratory diseases, etc.), but is also closely related to climate and environment. SO₂ is an important indicator of air quality, and closely related to volcanic eruptions. The SO₂ vertical column density (VCD) can provide a data basis for tracing the SO₂ pollution caused by the industrial emissions and early warning signals for volcanic eruptions around the world. In this research, the SO₂ slant column density (SCD) of environmental trace gases monitoring instrument II (EMI-II) from China was firstly retrieved using the differential optical absorption spectroscopy (DOAS) method. The air mass factor (AMF) look-up table of SO₂ was established using the SCIATRAN radiative transfer model. The SO₂ VCD was obtained after deducting the stripe effect. Taking the La Palma volcano at the end of October as an example, the SO₂ VCD from EMI-II was consistent with that from TROPOMI, with the correlation coefficients (R) of 0.89, 0.90, and 0.92, respectively. In addition, the SO₂ VCD from EMI-II was also compared with that from TROPOMI in Tonga submarine volcano. The EMI-II results showed similar spatial distributions with TROPOMI, and the transmission process (from the east to west direction) of SO₂ plume was monitored. Combined with the wind field data, the fluxes of SO₂ from 14 and 15 January 2022 in Tonga submarine volcano were calculated. The results of this research show that EMI-II can retrieve the reliable SO₂ VCD results in volcanic regions and realize the earth warning of global volcano eruptions.

Keywords: Differential optical absorption spectroscopy, EMI-II, SO₂ vertical column density, Tonga submarine volcano

GEO1033 - Analysis of Vertical Distribution of Stratospheric Ozone Based on Weighted Multiply Algebraic Algorithm

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Abstract. The weighted multiplication algebra method is used to invert the 2011 global ozone layer map from the SCIMACHY limb radiation data, and the verification has good accuracy. Through observations of global ozone stratification and studies of the fine structure of ozone, a link between global ozone transport and the Brewer-Dobson circulation was observed. The relationship between the Antarctic ozone hole, the Antarctic polar circulation and ozone-depleting substances is obtained through the stratification of ozone in the Antarctic region. Global ozone transport starts at low latitudes, and the stratosphere in the tropics generates a large amount of ozone. As thermals rise to the upper and middle stratosphere, cooling and falling are transmitted to the poles. The Brewer-Dobson circulation transports ozone from the tropics to the poles, affecting the distribution and abundance of ozone in the stratosphere, resulting in lower ozone concentrations in the tropics than in the polar regions. The global distribution of ozone levels varies at different heights in the stratosphere. At 15km and 20km, ozone accumulates at high latitudes; at 30km, ozone accumulates at low latitudes. Limited by the data-free area near the South Pole, it is impossible to map the ozone distribution in all areas. In the future, it is necessary to improve the algorithm or improve the satellite observation method to obtain complete global data. The vertical resolution of ozone is also low, only 3km, and future hardware upgrades will improve the vertical resolution. Since the near-surface radiation data is disturbed by factors such as terrain, aerosols and clouds, the problem of tropospheric ozone inversion remains to be solved. Global ozone change is a long process, often measured in years, so it also requires long-term multi-satellite joint observations.

Keywords: Limb satellites, Weighted multiply algebra.

Part V Acknowledgements

On behalf of the GeoRS 2022 Organizing Committee, we would like to take this opportunity to express our sincere gratitude to our participants. Without their support and contributions, we would not be able to hold the conference in any form. We would also like to express our acknowledgements to the Technical Program Committee members who have given their professional guidance and valuable advice as reviewers. For those who contribute to the success of the conference organization without listing the name here, we would love to say thanks as well.

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