

21-22
SEPTEMBER, 2023



ONLINE EVENT

JOINT EVENT ON

GEOLOGY AND

CLIMATE CHANGE

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21-22^{SEPT}

BOOK OF
ABSTRACTS

JOINT EVENT ON
GEOLOGY AND
CLIMATE CHANGE

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Keynote Speakers



Marte Gutierrez
University Transportation
Center for Underground
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(UTC-UTI), United States



Gareth B Neighbour
School of Engineering
& Innovation The Open
University, United Kingdom



Myint Win Bo
Toronto Metropolitan
University, Canada



Azzeddine Oudjehane
Southern Alberta Institute of
Technology, Canada



Shozo Yanagida
Osaka University, Japan



Leonid Anisimov
Volgograd State University,
Russian Federation



Virendra Goswami
IIT & Environment & Peace
Foundation, India

*Thank You
All...*

Speakers



Ahmad Behrouj Peely
Shiraz University, Iran (Islamic Republic of)



Alexey Yu Kazansky
Geological Institute RAS, Russian Federation



Ali Almohammed
Pandit Deendayal Energy University, India



Arun K Shandilya
Dr HSG University Sagar, India



B Venkateswara Rao
Water Technology Centre, PJTS Agricultural University, Hyderabad, India



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King Fahd University of Petroleum & Minerals, Saudi Arabia



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Queen's University Belfast, United Kingdom



Evdokimov Alexander Nikolaevich
St. Petersburg Mining University, Russian Federation



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North Eastern Regional Institute of Science and Technology, India



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Guilin University of Electronic Technology, China



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Maria Gabriela Meirelles
University of the Azores, Portugal



Maria Vicenta Esteller Alberich
Universidad Autónoma del Estado de Mexico, Mexico

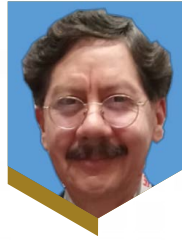
Speakers



Martina Gaglioti
LIPU, Italy



Natalia Lukina
Center for Forest Ecology and
Productivity RAS, Russian
Federation



**Oscar Andres Cuanalo
Campos**
Universidad Popular Autónoma del
Estado de Puebla, Mexico



Puran Ch Joshi
Soban Sing Jeena University,
India



Ravi Kikar Sinha
Private Indian Reporter, India



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Institute of Geonics Czech
Academy of Sciences, Czech
Republic



Sofwan Farisyi
Renewable Energy Creation
Foundation, Indonesia



Sonia Boudjabi
Université De Tebessa,
Algeria



**Vijayan Gurumurthy
Iyer**
Bihar Institute of Public
Administration , India



Xinshuo Zhang
Chongqing University, China

Welcome Message

Dear congress visitors, it is an honor and pleasure to write a few welcome notes.

To mitigate climate change, we must deploy a wide range of technologies to limit the anthropogenic release of CO₂ in the atmosphere. One such technology is carbon capture and sequestration (CCS) of CO₂, particularly geological sequestration (GS) in suitable underground formations such as saline reservoirs and abandoned and no longer productive oil and gas fields. Most of the CO₂ released comes from the underground, so it is only natural to bring the CO₂ where it came from. GS is particularly suited for CO₂ point sources such as coal and fossil fuel energy production facilities, where the CO₂ can be captured and transported by pipelines to a GS site. The advantage of CO₂ GS is that storage becomes more permanent with time as CO₂ becomes minerally stored in the reservoir. The disadvantage is the high cost. Several pilot projects are now being tested all over the world to show the viability of CO₂ GS.



Prof. Marte Gutierrez

USA

Welcome Message

Dear conference attendees, I am very honoured and indeed a great pleasure to write a few words to welcome you to their important meeting. Climate change is often perceived as something that is out of the control of the individual and in the purview of Governments in terms of large-scale policy implementation or potential engineering projects, perhaps. The reality is that each of us has a role to play and can act. Fundamentally carbon science and the science of climate change. It is also surprisingly widespread in everyday lives. Significant change is happening in terms of, for example, smart cities of the future, sustainable energy generation, electric vehicles and transport infrastructure, heats pumps and solar panels heating homes, intelligent design and selection of materials to replace steels and concrete. In many ways, progress is outstanding, but it is a challenge to implement solution on a timescale for society at large to have an impact in meeting the IPCC recommendations to limit warming. Ambitious action to secure 'deep, rapid, and sustained reductions in greenhouse gas emissions' is no easy task. This makes meetings such as this one vitally important to aid understanding, foster international collaboration and to accelerate progress. I wish you a wonderful meeting and please do hesitate to engage with colleagues, suggesting new ideas and collaborations and asking insightful questions that provoke advancing our learning. Enjoy!



Gareth B Neighbour

The Open University, United Kingdom

Welcome Message

Dear congress participants, it is my honor and pleasure to write a brief welcome notes for upcoming Geology 2023 to be held in Spain. Geology today has expended significantly to match the change in environment. Many sub-disciplines have been developed in recent decades with much progresses. Some of which are environmental geotechnics and geology, sustainable geotechnics, environmental hydrogeology, ocean geology, computational geotechnics, Artificial Intelligence in Geosciences etc: but not limited to. In order to catch up with the fast pace of developments in the several disciplines of geology, academics, researchers, learners and practitioners have been trying very hard to learn through lectures, trainings, workshops, publications and conferences while academics and researchers who are forefront of others are contributing their findings, experiences and research outputs through peer review journals and national, regional and international conferences. Among them, this conference could be one of them where geologists can source many of the developments in the sub-disciplines of geology.



Professor Myint Win Bo

Toronto Metropolitan University, Canada

Welcome Message

Dear Guests and Delegates of the Global Conference on Climate Change,

It is a privilege to welcome you at this year's EGCCC – Euro Global Conference on Climate Change. With effects

Climate change is by far the most significant issue the globe is facing. No other year has climate change been dominating the headlines like in 2023. This year has seen unprecedented impacts and effects from climate change ranging from severe weather changes, extended heat waves, extreme floods, drought and devastating fires.

At this year's conference, we will learn about the most recent development in all climate change matters from climate adaptation and resilience to the integration of technology in a global effort to climate change impacts.

Over the 3 days of the conference, there will be over 20 highly anticipated presentations. So, I wish everyone a great event and I look forward to stimulating discussions and learning.



Dr. Azzeddine Oudjehane

School of Construction, SAIT – Southern Alberta Institute of Technology, Canada

Welcome Message

Dear congress visitors, it is an honor and pleasure to give a few welcome notes. Politicians and environmental activists in major industrialized nations are now actively arguing that global warming and climate change are caused by carbon dioxide emitted as a result of human activity, and that energy development should not emit carbon dioxide. In the presentation, I would like to insist that global warming and the resulting climate change should be attributed to unpredictable solar activity exemplified by solar flares.

We know that the sun's rays contain far-infrared and radio wave (wavelength $500\sim 10^6$ cm⁻¹). Earth's surface consists of the ocean (with a salinity of about 3.4%) and the continent crust in a ratio of 7:3. The crust is composed of rocks and sand that are composed mainly of amorphous silica and crystalline silica. When seawater and amorphous silica absorb the sun's rays, they are heated up to emit radiant heat. On the other hand, dry air atmosphere that is composed mainly of nitrogen (78%), and oxygen (21%) does not absorb the radiant heat, so they dissipate heat into the atmosphere and cool down especially the atmosphere on continent crust. Density functional theory-based quantum chemistry molecular modeling (DFT/MM) is successfully adopted to verify that when the sun's rays are absorbed on the earth's surface, they become radiant heat energy maintaining the geothermal environment. An increase in the sun's rays due to solar flares causes climate change.



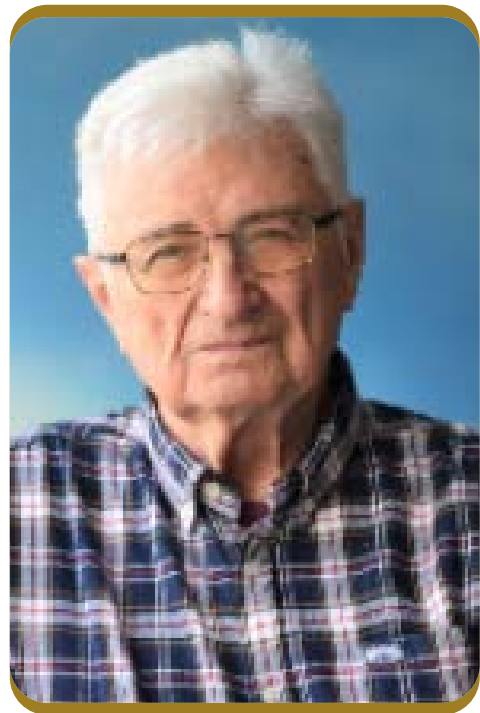
Prof. Dr. Shozo Yanagida

Osaka University Emeritus, Japan

Welcome Message

Dear colleagues,

We are participating in the “2nd Edition of Global Conference on Geology and Earth Science” (GEOLOGY 2023), the main motto of which is "GROUND: Geological Research Optimization Underlining Novel Discoveries". The Earth is a great laboratory that has been working for several billion years. Over the past centuries, man has studied how this system works and modeled it from a disk to a globe, and finally considered the Earth as a dynamic system with the movement of continents and as the Expanding Earth. The history of the Earth is an alternation of periods of sustainable development and disasters, and it gives us an invaluable basis to assess risks and predict the future development of the environment. Nevertheless, modern geology receives its main development from the study of natural objects and natural processes. The congress program consists of 40 sessions that cover all aspects of geology, taking into account the modern integration of sciences. Geoinformatics, geomechanics, geophysics, geochemistry should contribute to the successful work of the GEOLOGY 2023.



Prof, Dr. Leonid Anisimov

Volgograd State University, Russian Federation

Welcome Message

Dear Erudite participant,

It's my privilege to welcome you all at 'EGCCC 21-23, Sep'23, Spain in the honored capacity of Committee Member and Keynote Speaker at the 'Adaptation of Climate Change' Session, during UN-Decade of Ocean Science for Sustainable Development, began in 2021. We as a scientific community are here not only to raise awareness of the truly global dimension of the ocean, address environmental challenges, and set forth on a path towards a resilient planet but also do Satellite Study of Ocean Systems Interactions, Risks, Instabilities and Synergies (OSIRIS), Correlation of Ocean-Cryosphere Interactions, Climate change and Role of Artificial Intelligence to explore the deep seas and development of Numerical Ocean-Cryosphere Climate Variability Prediction Model (NOC-CVPM), over the oceanic -Cryosphere regions. The kinematic features of the mesoscale convective systems over Arctic- North Atlantic Ocean regions would be correlated with ocean-cryosphere Climate variability on time & Space Scales; at the local, regional and global levels through the extracted Sea Surface Temperature (SSTs) over the grid box(10-10) , attributing the regional change to natural and anthropogenic radiative forcing agents to bring out the few optimum values of these (OSIRIS) to develop Numerical Ocean-Cryosphere Climate Variability Prediction Model (NOC-CVPM), through the process of Initialization, Computation, Parameterization, within the (1 x 1) deg. grid-box by the computer algorithm, and using High Resolution Satellite imageries, data access, assimilation; HPC and cloud computing for real-time analysis and Artificial Intelligence to explore the deep seas.



Prof. (Dr.) Virendra Goswami

Indian Institute of Technology (IIT) & Environment and Peace Foundation, India



ABOUT MAGNUS GROUP

Magnus Group (MG) is initiated to meet a need and to pursue collective goals of the scientific community specifically focusing in the field of Sciences, Engineering and technology to endorse exchanging of the ideas & knowledge which facilitate the collaboration between the scientists, academicians and researchers of same field or interdisciplinary research. Magnus Group is proficient in organizing conferences, meetings, seminars and workshops with the ingenious and peerless speakers throughout the world providing you and your organization with broad range of networking opportunities to globalize your research and create your own identity. Our conferences and workshops can be well titled as 'ocean of knowledge' where you can sail your boat and pick the pearls, leading the way for innovative research and strategies empowering the strength by overwhelming the complications associated with in the respective fields.

Participation from 90 different countries and 1090 different Universities have contributed to the success of our conferences. Our first International Conference was organized on Oncology and Radiology (ICOR) in Dubai, UAE. Our conferences usually run for 2-3 days completely covering Keynote & Oral sessions along with workshops and poster presentations. Our organization runs promptly with dedicated and proficient employees' managing different conferences throughout the world, without compromising service and quality.

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DAY 01

KEYNOTE FORUM

JOINT EVENT ON
**GEOLOGY AND
CLIMATE CHANGE**

The remarkable story of nuclear graphite and its contribution towards achieving net zero

Technology has a key part to play in mitigating and tackling climate change. Some technologies have been unrecognised in the role they have played to date and have a bright future and potential in contributing further. Carbon is one such material. For example, it is core to the adoption of sustainable electric vehicles in the use of novel lightweight and stiff materials as well as constituting the majority by volume of the batteries used in the form of graphite. One special form of graphite is 'nuclear graphite' whose role has largely been forgotten over the past 80 years. Nuclear graphite is a high-purity form of graphite that is used in nuclear reactors for civil energy generation, electricity, as a moderator and structural material. It is made from high-quality carbon-based materials, typically derived from petroleum coke or coal tar pitch, that is purified and processed to remove impurities to enhance its performance in a nuclear environment and consequently more efficient energy production. The properties of nuclear graphite are unique with high thermal conductivity, low neutron capture cross section, and high mechanical strength, which make it an ideal material for the extreme conditions found in nuclear reactors. Nuclear graphite has played a significant role in the journey towards net zero emissions and this material has the potential to help us achieve a more sustainable future. This presentation will explore the history and current uses of nuclear graphite, as well as its further potential to contribute to a low-carbon future by evidencing how current and new reactor technologies can avoid greenhouse gas emissions as well as powering the electric vehicle revolution.



Gareth B Neighbour

School of Engineering & Innovation The Open University,
United Kingdom

Biography

Gareth joined the Open University in 2019 is currently Head of School. Previous roles include Professor/Head of School of Engineering and the Built Environment at BCU, Professor/Head of Mechanical Engineering and Mathematical Sciences at Oxford Brookes and Deputy Dean of Science at University of Hull. To date, he has provided independent research and advice to the nuclear and other heavy industries including EDF Energy, the regulator and also the IAEA and has a substantial research income to date. He is currently the Senior Editor of the high impact journal, Carbon (Elsevier) and a past Chair of the British Carbon Group.

Climate change is caused by radio emission of solar flares: Molecular modeling validation based on density functional theory

The rationale for this study is based on Density Functional Theory Molecular Modeling (DFT/MM). DFT/MM theoretically predicts the absorption spectra in the microwave and radio regions (500-0 cm⁻¹) (FIR region) of ocean water (H₂O) and SiO₂, the main component of terrestrial rocks. It can be verified that heat radiation upconversion in the infrared region (4000-0 cm⁻¹) (IR region) results in terrestrial thermal radiation. The thermal radiation affects the global climate change. Because, DFT/MM also predicts and verifies that the radiant heat warms up hydrated nitrogen molecules [N₂(H₂O)₂] and hydrated oxygen molecules [3O₂(H₂O)₂] and [1O₂(H₂O)₂] on the equator region where solar FIR are abundant through the year.

The high humidity warms the atmosphere because of no radiation cooling. As a result, the warm air masses form effectively on the earth near the equator. On the other hand, the high-altitude regions (e.g., regions near Arctic and Antarctic), where solar FIR region do not fall enough throughout the year, keeps low temperature and the atmosphere become low humidity. Then, the atmosphere can not absorb terrestrial thermal radiation, and the cold air masses are formed in the region. Both the warm and cold air masses dominate steady-state global climate change throughout the year especially when the solar activity is steady state.

On the other hand, it is feared that solar flares, which occur during the active period of the solar, generate energized FIR, causing radio wave interference on the earth. The fact proves that solar flare must affect the generation of especially the warm air masses on the earth. The FIR emission from solar flares causes global climate change. It should be reasonable that the occurrence of flares will also affect global warming.

Those who blame carbon dioxide for global warming often cite melting glaciers, melting permafrost, and loss of Arctic sea ice as signs of global warming. However, DFT/MM reveals that the frozen water model [(H₂O)₆] have more intense absorption peaks than those of liquid H₂O model [(H₂O)₃] in the FIR region, validating that the FIR absorptions of the ice will effectively be upconverted to IR absorption, leading to the preferential ice melting rather than liquid-state water.

I hope that it will become common knowledge that global climate change depends on solar activity, never on atmospheric low concentration carbon dioxide [(CO₂)₃] and methane [(CH₄)₃]

Audience Take Away Notes

- I will accept the request
- Density functional theory means molecular modeling for equilibrium



Shozo Yanagida

Professor Emeritus, Osaka University, Ibaraki, Osaka, Japan

Biography

Shozo Yanagida (Emeritus Professor of Osaka University since 2004) is a pioneer of molecular-structured solar cells, especially DSSC, and since 2011, he has been staying at the forefront with regards to quantum chemistry molecular modeling of van der Waals force-aggregates. Now, he has come well known as a molecular modeling chemist. He may appreciate it if you check internet using key words "Shozo Yanagida, molecular modeling". In Osaka University, Institute of Science and Industrial Research (ISIR), he opened Energy Solution Material Laboratory of M3 Laboratory Inc. Incidentally, "M3" stands density-functional theory based molecular modeling of materials.

geometry of van der Waals force aggregates of molecules. Density Functional Theory Molecular Modeling is a theoretical chemical experiment that gets facts right for scientists

- Yes, this research that other faculty could use to expand their research or teaching
- yes, it does provide a practical solution to a problem that could simplify or make a designer's job more efficient
- Yes, it improve the accuracy of a design, or provide new information to assist in a design problem

Geotechnical ground investigation

The term “ground” is defined in BS 5930 (1999) as covering soils, rocks, and made ground (e.g., reclaimed land). While Field Investigation refers to investigating the whole site and surrounding field for all aspects, Site Investigation investigations cover only the whole site for all aspects. However, Ground Investigation only investigates the ground and below ground aspects of the site, which may include soils and rocks, groundwater, and contaminants. This talk will cover the scope of the geotechnical aspect of ground investigation, covering soils, rocks, and ground-water with special emphasis on soil.

Ground Investigation is required for foundations and ground engineering works, which are usually included in infrastructure developments. In order to obtain the ground profile, groundwater conditions, and geotechnical parameters, ground investigation must be carried out at the proposed infrastructure development site. During the ground investigation, in-situ testing is necessary to obtain soil geotechnical parameters and collections of suitable types of disturbed and undisturbed samples for visual inspection and further laboratory testing such as classification tests, strength and consolidation tests. These collected disturbed and undisturbed samples are tested in an accredited geotechnical laboratory to obtain the required geotechnical parameters. The geotechnical data and parameters obtained from the properly planned geotechnical investigation can only provide valid analyses and design output. In order for the geotechnical engineer to plan an appropriate ground investigation which could provide all the necessary information, advanced knowledge of the site and surrounding area is required. To understand the site and the surrounding area, one has to start with a desk study, which means searching the information available in the public domain, literature, and data collections. This talk will go through from desk study, preliminary investigation, intrusive investigation to specialized in-situ testing and geotechnical instrumentation during ground investigation.



Myint Win Bo

Toronto Metropolitan University,
Canada

Biography

Myint Win Bo is the President and Chief Executive Officer at Bo & Associates Inc., Canada. He graduated with a B.Sc. degree (Geology) from the University of Rangoon and received a Postgraduate Diploma in Hydrogeology from University College London, UK, and M.Sc. degree from the University of London, UK. He obtained his Ph.D. in Civil Engineering (specialized in geotechnics) from the Nanyang Technological University, Singapore, and obtained a Certificate of Executive Management and Leadership from the Massachusetts Institute of Technology, USA. He is a Fellow of the Geological Society, London, UK, and a Fellow of the Institution of Civil Engineers, UK. He

is also a professional engineer, professional geoscientist, International Professional Engineer (UK), Chartered Geologist, Chartered Scientist, Chartered Engineer, Chartered Environmentalist, Chartered Manager, European Geologist, and European Engineer. Dr. Bo has been serving many professional societies as a committee member at both national and international levels. Dr. Bo has worked on four continents — North America, Europe, Asia, and Oceania. Dr. Bo is an experienced practicing engineer, geologist, environmentalist, scientist, and entrepreneur as well as an educator, and he has given more than 40 special/keynote lectures and workshops at international conferences, tertiary institutions, and professional associations. Dr. Bo is also an Adjunct Professor at York University and Ryerson University, Canada, as well as at Swinburne University of Technology, Australia. He has published five textbooks, five book chapters, and over 200 technical papers for international journals and conferences. Dr. Bo is an Editor for five international journals including the Environmental Geotechnics Journal and Geotechnical Research Journal published by the Institution of Civil Engineers (ICE), UK. His work has been cited more than 5000 times in referred journals and proceedings. Dr. Bo is a winner of more than \$ one million in research grants and also the winner of many awards for personal achievements as well as having designed many award-winning projects around the world.

Application of artificial intelligence and remote sensing in tackling aggravated climatic challenges through correlational study of ocean-cryosphere interactions with climate variability by developing numerical ocean-cryosphere climate variability prediction model (noc-cvpm)

Seminal scientific research is needed to develop Numerical Ocean-Cryosphere Climate Variability Prediction Model (NOC-CVPM), tackling Aggravated Climatic Challenges by computing Correlation of Ocean-Cryosphere Interactions with Climate Variability by using artificial intelligence and advanced Remote Sensing technologies, in order to understand the major Atmospheric challenges due to extreme weather events caused due to mesoscale convective systems, Global Carbon Cycle, Ocean Salinity, and Marine Pollution resulting due to the toxin, toxic gases, Global Warming, along with sub-mesoscale dynamics of Arctic ice sheet stability, ice and bedrock coring, ice sheet modelling, and ice sheet processes over the Cryosphere (Arctic), Oceanic and sub-surface Oceanic and Atmospheric regions.

The term “cryosphere” comes from the Greek word, “krios,” which means cold e. g. Arctic, Greenland & Antarctica regions. The Canadian Scientists in 2016 found that the OceanAtmosphere- Cryosphere (OAC) interaction is more evident on North pole i. e. Arctic regions.

In Feb’17, Researchers found that the unstoppably melting of the glacier into the ocean mainly because of warmer seawater lapping at its underside. Prof. Peter Clark, OSU attributed that the Glacier retreat was due to rising levels of Carbon Dioxide and other GHG, as opposed to other types of forces. If, this continues then the most of Glaciers would disappear in the next few centuries & the Glaciers loss in future will be contributing to rising sea levels, environmental pollution vis-à-vis Climate Change.

The understanding of impacts of multiple stressors on the ocean and the associated risks of abrupt state shifts can be explored through the comprehensive studies of Ocean Systems Interactions, Risks, Instabilities and Synergies (OSIRIS) as well as climate variability due to coupled Ocean-Cryosphere interactions and by developing Numerical Ocean-Cryosphere Climate Variability Prediction Model (NOC-CVPM), over the oceanic -Cryosphere regions.

The kinematic features of the mesoscale convective systems over Arctic-North Atlantic Ocean regions would be correlated with ocean-cryosphere Climate variability on time & Space Scales; at the local, regional and global levels through the extracted Sea Surface Temperature (SSTs) over the grid box(10-10), attributing the regional change to natural and anthropogenic radiative forcing agents to bring out the few optimum



Virendra Kumar Goswami

Indian Institute of Technology (IIT) & Environment and Peace Foundation, India

Biography

Dr. Virendra Goswami, Ph. D Indian Institute of Technology (IIT), Kharagpur, MS from the University of Wisconsin, USA. Post Doctorate Fellow (PDF) at the University of Illinois, Chicago, USA. ‘Visiting Scientist’ to UNIDO, ICTP, Italy & International Civil Aviation Organization (ICAO), Canada. Founder President ‘Environment & Peace Foundation, and Wing Commander (Retd), with 550 hours of flying as a supernumerary Aircrew. Dr. Virendra Goswami worked at Space Science Engineering Centre, NOAA(NASA) at the University of Wisconsin, USA. Former Vice-Chancellor (Rector): Sangam & Sunrise Universities. Had been Director General /Director of Management /Engineering Institutes. More than 44 years of teaching, research, and administrative experience at Home and abroad. Member: American Geophysical Union, American and Indian Meteorological Societies. Special Invitee by the World Meteorological Organization (WMO) in 2001& 2016. Invited Speaker in Apr’15 at NPW: NSF, NCAR, USA, Meteo-France, WMO, CLIVAR, and Lomonosov Moscow State University, Globalistic-17& ‘Globalistic-20 TROPMET-20, Euro-Marine2021, WAC2022. Late-ly, appointed Reviewer /Member of

values of these (OSIRIS) to develop Numerical Ocean-Cryosphere Climate Variability Prediction Model (NOC-CVPM), by using High Resolution Satellite imageries, data access, assimilation; HPC and cloud computing for real-time analysis and Artificial Intelligence to explore the deep seas.

Next, through the process of Initialization, Computation, Parameterization, within the (1 x 1) deg. grid-box by the computer algorithm, the Numerical Prediction Models for Ocean - Cryosphere Climate variability over Arctic & North Atlantic regions would be developed i. e. Numerical Ocean-Cryosphere Climate Variability Prediction Model (NOC-CVPM).

Keywords: Climate Change, Numerical Ocean-Cryosphere Climate Variability Prediction Model (NOC-CVPM), Ocean Systems Interactions, Risks, Instabilities and Synergies (OSIRIS), Correlation of Ocean-Cryosphere Interactions, Artificial Intelligence and Remote Sensing.

Audience Take Away Notes

- About Satellite Study of Ocean Systems Interactions, Risks, Instabilities and Synergies (OSIRIS), Correlation of Ocean-Cryosphere Interactions, Climate change and Role of Artificial Intelligence to explore the deep seas and development of Numerical Ocean Cryosphere Climate Variability Prediction Model (NOC-CVPM)

Editorial Board of Royal Meteorological Society (R. Met. S), Atmospheric Science Letters (R. Met. SAL) as well as Prof. Emeritus: Sharda Univ, and GNEC, Medical College, New Delhi.

Achieving a carbon free built environment with circular economy

Global commitment to achieving net zero objectives by 2050 and beyond continues as global industry sectors transitions to new innovation and low emissions materials. A circular economy practice can accelerate the process of achieving net zero. Circular economy revolves around waste and pollution reduction while extending the lifecycle of products and materials. The integration of a circular economy framework within the construction sector may accelerate lowering the carbon impact induced by the built environment.

Audience Take Away Notes

- Identifying the needs and challenges to achieve a zero carbon built environment
- Defining the principles of a circular economy within the realm of construction
- Recognizing the challenges and opportunities for encompassing a circular economy framework for the built environment



Azzeddine Oudjehane

SAIT – Southern Alberta Institute of Technology, Canada

Biography

Dr. Azzeddine Oudjehane is an Instructor from the BSc CPM at SAIT. Azzeddine joined SAIT in 2012, to teach in the Bachelor of Science in Construction Project Management program and develop applied and scholarly research opportunities that meet the needs of Alberta's construction industry. With over 30 years of experience leading multi-disciplinary projects in R&D, business innovation and market development he has worked with various stakeholders from Academia, Government and Industry. Azzeddine holds graduate degrees in both Applied Science and Business Administration.

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DAY 01

SPEAKERS

JOINT EVENT ON
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**Xinsho Zhang**

Faculty of Architecture and Urban Planning, Chongqing University, Chongqing, China

The impact of air pollution on global solar radiation

Ground-received solar radiation is affected by several meteorological and air pollution factors. This study aimed to analyse the effects of air pollution characteristics on solar radiation. Meteorological data, Air Quality Index (AQI) data, and data on the concentrations of six air pollutants (O_3 , CO, SO_2 , PM10, PM2.5, and NO_2) in nine cities in China were considered for analysis. A city model (model-C) based on the data of each city and a unified model (model-U) based on national data were established, and the key pollutants under these conditions were identified. Correlation analysis was performed between each pollutant and the daily global solar radiation. The correlation between O_3 and daily global solar radiation was the highest ($r=0.575$), while that between SO_2 and daily global solar radiation was the lowest. Further, AQI and solar radiation were negatively correlated, while some pollution components (e.g., O_3) were positively correlated with the daily global solar radiation. Different key pollutants affected the solar radiation in each city. In Shenyang and Guangzhou, the driving effect of particles on the daily global solar radiation was stronger than that of pollutants. However, there were no key pollutants that affect solar radiation in Shanghai. Furthermore, the prediction performance of model-U was not as good as that of model-C. The model-U showed a good performance for Urumqi ($R^2=0.803$), while the difference between the two models was not particularly significant in other areas. This study reveals the impact of air pollution on solar radiation, and provides significant insights to improve the accuracy of regional solar radiation prediction and fill the gap regarding the absence of long-term solar radiation monitoring data in some areas.

Audience Take Away Notes

- Helps to recognize the impact of air pollution
- Provide data support for the utilization of solar energy resources
- Provide reference for government personnel to control pollutants

Biography

Dr. Zhang Xinshuo studied architecture at the Chongqing University and graduated from Master of Engineering in 2020. Subsequently, she pursued a doctoral degree at the same university. She has published 5 research articles in the SCI (E) journal.



Iuliana Laura Calugaru

Industrial Waste Technology Center (CTRI), Rouyn-Noranda, Quebec, Canada

Opportunities for waste recovery in mining industry

Mining industry has an essential contribution to the global economic development and to the overall progress of the human society. At the same time, mining industry generates and must handle responsibly large volumes of residues with significant environmental impacts.

Several gigatons of waste rock are generated yearly worldwide by mineral resources extraction and this amount is expected to grow with the increase of metals global demand and of the lower-grade larger-scale deposits exploited. The waste rocks are removed to access the orebody and are stored in large surface piles, exposed to the environmental conditions. However, the recovery of the waste rock for roads / railways construction and reparation, manufacturing of construction materials (e.g. bricks, concrete and clinker), concrete and steel sandblasting, aggregates and restauration, reduces the environmental footprint of mining activity.

The interaction between the run-off and the mine waste rocks and tailings can generate acidic, neutral or alkaline mine drainage, bearing variable concentrations of contaminants: metals (Cd, Ni, Mn, Pb, Zn), metalloids (As, Sb), anions (CN^- , SO_4^{2-}) and having season impacted flow. Moreover, environmental repercussions of the mine drainage may persist hundreds to thousands of years after mine closure. In order to limit the discharge of contaminants into environment, mine drainage treatment is mandatory, although costly, while after mine closure, passive treatment becomes a challenge. However, mine drainage bears interesting concentrations of useful metals (Ni, Zn) that can be recovered within the process of water treatment. Mine water treatment is also an opportunity to recover waste generated by different anthropic activities (agriculture, various industries, sewage sludge). Waste can be modified by simple treatment in order to increase its stability and performance for water treatment, and once spent, it can be further processed to recover the treated metals. Moreover, restauration of mine sites after closure involves revegetation. The organic layer necessary to the implantation of the vegetation can be constituted from readily and largely available agricultural waste, or food industry waste, compost. Large amount of various waste (e.g. ash, eggshells, seashells) can be recovered in this way, while their disposal is challenging. Waste rocks and tailings originated from former mining operations bear interesting grades in valuable metals (Au, Cu, Ni, Zn), sometimes even higher than those currently mined, as mining techniques have improved over the past decades. From these sources, metals are successfully recovered by chemical and biological leaching.

Briefly, mining industry continue to sustain our standard of living while handling responsibly large volumes of waste. Some waste can be recovered (construction, restauration), or used as a source to further recover economic values (metals). In addition, mine water treatment and restauration of closed mine sites employ various waste with challenging disposal.

Audience Take Away Notes

- The presentation will be representative for the approach in Québec, Canada. It could improve the social acceptability towards mining projects. Over the past decades, numerous scientific papers have

been published on mine drainage prediction, mine waters treatment by waste issued from anthropic activities, metals recovery. Within my presentation, results of several applied science projects will be presented, to support our approach and, by the mean of references (published scientific papers and reports), to inspire the audience for further research work and applied science projects

- Firstly, the work described within the references that will be mentioned in the presentation could be useful for specialists from the mining sector (students, professors, professionals). Secondly, new partnerships could eventually be established after the conference
- Definitely, our research work is up to date in the mining field
- Yes, this provide a practical solution to a problem that could simplify or make a designer's job more efficient
- Yes, it improve the accuracy of a design, or provide new information to assist in a design problem

Biography

Dr. Calugaru graduated Mineral Engineering doctoral program of Montreal University (2019). She is project manager at the Industrial Waste Technology Center (CTRI) since 2012 and chemistry professor at the College of Abitibi-Temiscamingue since 2008. Dr. Calugaru works in the field of characterization of solids and effluents, passive and active treatment of mine waters, prediction of the quality of the mine drainage, metals recovery by chemical leaching. She has worked as main researcher or co-researcher in more than 10 applied science projects. She has presented her research results in scientific articles (13), scientific conference papers (5), international conferences (9).



Maria Gabriela Meirelles

Department of Sciences of Physics, Chemistry and Engineering/University of the Azores, Ponta Delgada, São Miguel, Azores, Portugal

Climate change: The impact of rising temperatures on the reduction of global yield of the main cereal crops

There are many ways in which climate change can impact food security and therefore human health. Our climate is changing and, given the levels of greenhouse gases already present in our atmosphere, these potentiate extreme weather events, with social, economic and ecological consequences. Increasingly higher global average temperatures are likely, if drastic changes in greenhouse gas emissions are not registered, through a wide range of policies to be adopted. Over the last half century, the direct impact of climate change has manifested itself in the decrease in crop yields of cereal crops (corn, wheat, rice and soybeans). According to the United Nations, currently, one in every nine people in the world is undernourished, making a total of 815 million of people. If no measures are taken, the forecast is that this number will reach two billion people in 2050. Soil protection and restoration are therefore important for food security, climate change mitigation and biodiversity conservation. This includes sustainable agriculture practices, such as the use of low-carbon agricultural practices and the recovery of degraded areas. Soil biodiversity and sustainable soil management are preconditions for attaining Sustainable Development Goals (SDGs). Food production through sustainable agriculture are preconditions for attain some of the Sustainable Development Goals (SDGs). These are: Goal 1 - No Poverty, Goal 2 - Zero Hunger, Goal 5 - Gender Equality, Goal 6 - Clean Water and Sanitation, Goal 10 - Reduced Inequalities, Goal 12 - Responsible Consumption and Production, Goal 14 - Life Below Water and Goal 15 - Life on Land.

In this study we use the En-Roads simulator, which is a simulation model that explores how to deal with global energy and climate challenges through political, technological and social changes. It lets you create scenarios that focus on how changes in taxes, subsidies, economic growth, energy efficiency, technological innovation, carbon prices, fuel mixes, and other factors will change global carbon emissions and temperature. Considering current data, the simulator predicts a temperature increase of 3.6°C by the year 2100. A concentration of greenhouse gases that will be around 907.86 ppm, with 712.6 ppm of CO₂. The projected temperature increase has negative consequences on cereal production. Showing a 21% decrease in corn harvest yield, 17% for wheat, 9% for rice and soybeans.

Considering in 2100 a world population of around 11.8 billion people, a growth of the world economy around 2.5% per year and introducing public policies in terms of energy supply, transport, buildings and industry and of land use, the simulator predicts a warming of 1.5°C by 2100, using the pre-industrial era as a reference. For such a scenario to be feasible, the supply of energy will have to take place using renewable alternatives. To discourage the use of fossil fuels, the price of carbon in 2100 should be around 250 \$/ton CO₂. Taking 2021 as a reference, there must be a 50% reduction in the use of oil and 85% in the use of coal, while energy efficiency in transport should grow by 4.9%/year, so that by 2100 all vehicles were electric. In buildings and industry, energy efficiency must grow by 5%/year and electrification by 100%. Regarding greenhouse gas emissions from the soil, it is necessary to reduce deforestation by 10%/year and reduce CH₄ emissions by 60%. In industry, it is the emission of fluorinated gases that will have to be reduced by 60% by the end of the century. This simulation also took into account the removal of existing carbon in

the atmosphere through afforestation (planting 98% of the land reserved for this use) and the removal of 30% using technologies for this purpose. Against this backdrop, projections indicate a 6% decrease in corn harvest yields, 4% for wheat, 2% for rice and soybeans.

Food security is associated with global political strategies, including the United Nations SDGs and compliance with the Paris Agreement, contributing to a lower impact on cereal production.

Audience Take Away Notes

- Understand how the Sustainable Development Goals can contribute to food security
- Through the simulation of scenarios using the En-Roads simulation model
- Participate in political, technological and social decisions about global challenges
- Allow each citizen to rethink their lifestyle
- Yes, they can create scenarios and obtain future climate projections, using the En-Roads simulation model
- Yes, this provide a practical solution to a problem that could simplify or make a designer's job more efficient
- Yes, it improve the accuracy of a design, or provide new information to assist in a design problem

Biography

Maria Gabriela Meirelles has a Diploma in Physics from the State University of Rio de Janeiro, Brasil in 1992, a Geophysics Master in the field of Meteorology from University of Lisbon (Faculty of Sciences), Portugal in 1997 and got her PhD in Physics from the Azores University (UAC), Portugal in 2009, in the field of Geophysical Sciences. Her teaching activities include topics on meteorology/atmosphere/climatology, general physics, physics for biology and geophysics, among others, for under graduate and master studies. She has participated in several scientific conferences and she has published several research articles and book chapters.



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Development of a unified national system for monitoring carbon pools and greenhouse gas fluxes in terrestrial ecosystems of Russia

The development of a national system for monitoring carbon pools and greenhouse gas fluxes of terrestrial ecosystems has commenced in the Russian Federation under the innovative project "Unified National Monitoring System for Climatically Active Substances" since 2022. The consortium consists of 21 organizations, including institutes of the Russian Academy of Sciences, universities, and state unitary enterprise. For a reliable assessment of the ability of ecosystems to absorb climatically active substances, an integrated system of on-ground and remote sensing measurements, assessment methods and models are developed. A unified monitoring network covers diverse ecosystems types, with sets of models created for at the local, regional and national forecasts. Simultaneously, an integrated information and analytical system is being developed to collect, storage and analyze the information. The establishment of routine data collection on the carbon and nitrogen cycle within natural ecosystems of the country, including forests, steppe, tundra, forest-tundra, forest-steppe, swamps and wetlands, as well as agricultural ecosystems and abandoned farmlands overgrown with trees and shrubs, and analysis of monitoring data results at different spatial levels are possible only when using the developed in the project methods for integration of ground-based measurements, remote sensing data and mathematical modeling. An approach has been developed for designing a monitoring network for assessing the carbon balance at the national level, which makes it possible to ensure the spatial, typological and statistical representativeness of the country's terrestrial ecosystems, and predict their state and resilience under rapid climate change. The first phase of the project is currently underway, focused on network organization, methodology harmonization, baseline data collection on vegetation and soil characteristics, and assessment of carbon balance and greenhouse gas fluxes. The obtained data are used for validation and initialization of simulation models, which are applied for projective assessment of expected changes in carbon pools and fluxes of greenhouse gases in terrestrial ecosystems under different scenarios of land-use and climate change. The improvement of National Cadastre of greenhouse gases based on new databases is expected. Discussion encompass the developed methodology and methods, the monitoring network project, and the obtained and anticipated outcomes.

Biography

Prof. Natalia V. Lukina studied Biology at the Petrozavodsk University, Russia, and graduated as MS in 1979. She then worked at the Institute of Industrial Ecology of the Kola Scientific Centre of the Russian Academy of Sciences (INEP KSC RAS). She received her PhD degree in 1990 at the Botanical Institute V.L.Komarov of the Russian Academy of Sciences, D.Sc degree in 1996 at Moscow State University M.V.Lomonosov, Professor (Ecology) - in 2006.



Sofwan Farisyi^{1*}, Samsul Maarif²

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Electric boats for fisherman as a substitute for fuel oil on the belitung Island (Indonesia)

Fishermen are one of the types of livelihood that are commonly carried out by Indonesian people who live on the coast. Indonesia has the longest coastline in the world, so fishermen should have good welfare and healthy living patterns. However, in reality, most traditional fishermen in Indonesia have not experienced it, they still carry out fishing activities in an inefficient way, because they only follow the work patterns that have been done by their predecessors, far from the touch of technological advancements that have an impact on high operational and maintenance costs during fishing. This is due to the use of energy that is wasteful, such as fuel and limited fuel availability. This research tries to find solutions to overcome the problem, especially on the use of more efficient technology, so that it can reduce expenses and make fishermen healthier from pollution when catching fish. The research can support sustainable development goals (SDGs) programs number 7, 8, and 13, which are clean and affordable energy, combating climate change, and sustainable economic growth. To complete this research program, there are several stages, including observation to the research location, designing an electric boat (e-boat) system based on existing conventional ships, simulation, and laboratory scale testing. Based on our survey conducted on Mendanau Island, there is a village consisting of 140 traditional fishermen. The income they earn is around 15 USD per day. This income should be deducting about 5 USD for feed and fuel cost (around 3 liters of fuel) The final income of this traditional fisherman is 10 USD per day. On average they can go sailing 20 days every month. In other words their average monthly income is 200 USD, still very low and far from sufficient. If they use an electric boat, there will be a reduction in fuel cost around 3 USD. It will be increase their income around 30%. In addition, it will also reduce emissions around 6.86 tCO₂. The total emission that can be reduce if all 140 traditional fishermen use this electric boat is 19,208 tCO₂. In conclusion this project will increase the income of traditional fishermen by 60 USD every month (30%) and reduce emissions by 137.2 tCO₂.

Biography

Sofwan Farisyi got Bachelor's education at the University of Indonesia majoring in Mechanical Engineering from 1988 to 1992, then pursuing Master's education at the University of Indonesia majoring in Marketing from 1997 to 1999. Doctoral Program in Administrative Science at Brawijaya University with a focus on Business Administration 2020-2023. His research focus on sustainability and SDGs. In addition, attended Executive Programs at Cambridge Judge Business School in the United Kingdom in 2021 with the program material "Circular Economy and Sustainability Strategies", and at Harvard Business School in the United States in 2021 with the program material "Sustainable Business Strategy". Holds a patent for a house with a "Dual Electrical System (Fuel Cell Hydrogen & Solar Cell)" named "Sofwan House" collaboration with University of Indonesia. Also founded a donation platform for Renewable Energy and SDGs called Indonesiagreen.com and Renewable Energy Creation Foundation.



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Linking between color and element concentration for fluorite: An optical spectroscopic approach

The cause of color in fluorite has been studied by mineralogists in the interest of aesthetics to link the geochemistry of specific mineral deposits, and their application as lasers. The color of fluorite minerals has been connected to the existence of defect centers, structural faults, impurity ions, REE-associated defect centers, and the presence of a transition group of elements in fluorite. All these components impact the fluorite hue, and an attempt has been made in this work to link the color of Amba Dongar fluorite in India with rare earth elements and transition elements concentration. UV-visible, fluorescence, and photoluminescence spectroscopic analysis was used to characterize eight fluorite samples of different colors, while element concentration data from ICPMS was used to link the same. UV-visible absorption spectroscopy of all the fluorite samples clearly demonstrated that when higher absorption is observed between 300 to 560 nm wavelength compared to higher wavelength (> 560 nm), shades of yellow color fluorite are evident, which may be correlated to higher Sr concentration. Lower absorption between 560 to 580 nm represents shades of purple and blue color fluorite, which may be due to the presence of Ca- colloids and high Yttrium concentration. Overall flat absorption throughout the visible wavelength, is resulted from the colorless fluorite samples. Emission spectra acquired in $\Delta\lambda$ (50 nm) mode of all the fluorite samples showed more or less similar emission peaks due to the presence of eight REE Ions. Detail analysis clearly indicated that the dark yellow color is due to the presence of Tb^{3+} , and the light-yellow color is due to the presence of Dy^{3+} , Ce^{3+} , Ho^{3+} , Er^{3+} , and Gd^{2+} , while blue and purple color is resulted due to the presence of Eu^{3+} . Photoluminescence spectroscopy of yellow fluorite show emission at different wavelength due to the presence of Dy^{3+} and Er^{3+} , while blue and purple fluorite showed emission due to Sr^{2+} , Er^{2+} . Sr concentration is less in purple and colorless fluorite, while it increases from light yellow to dark yellow, as evident from ICP-MS data. The total REE concentration of all the samples doesn't show much variation in all the fluorite samples.

Keywords: Fluorite, Optical Spectroscopy, Amba Dongar, Color Variation, ICP-MS, REE.

Audience Take Away Notes

- UV-visible, fluorescence, and photoluminescence spectroscopy examination was utilized to describe eight fluorite samples of varying hues, while element concentration data from ICPMS was used to connect the same
- comprehending why these components affect the fluorite hue, where an attempt has been made in this work to link the color of Amba Dongar fluorite with rare earth elements and transition elements concentration

Biography

Mr. Ali Al Mohammed, Syrian nationality, has a bachelor's degree in applied geology from Al-Baath University, Homs, Syria, and graduated in 2017. Mr. Ali joined as a teaching assistant in the applied geology department at Al-Baath University in 2019. I joined the Master of Technology in Petroleum Exploration in 2019 and graduated in 2021 from Pandit Deendayal Energy University (PDEU), Gandhinagar, Gujarat, India. Currently, he is a Ph.D. student at (PDEU) working

on a thesis under the title: Economic mineral deposit in igneous and metamorphic rocks, a study on fluorite mineral in Amba Dongar and manganese mineral in Shivrajpur, Gujarat, India.



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Landslides. Rainfall one of the main triggering factors in the mountainous regions of Puebla, Mexico

The rains are one of the main triggers of landslide phenomena in the mountainous region of Puebla, which values reach up 4500 mm/year in some places in this area. Rainfalls combined with other factors such as morphology (mountainous topographic relief with strong inclinations), strongly folded sedimentary rocks (conglomerates, sandstones, siltstones, and limestones), rock discontinuities (fissures, cracks, joints, stratigraphic planes, etc.) and human activity (cuts, excavations, overloads, mining, water discharge, deforestation, land use change, etc.), offer a scenario prone to landslide phenomena that cause human casualties, economic and environmental losses. The landslides disasters have affected many social sectors from these communities (housing, education, health, hydraulic infrastructure, electricity, communication, transportation, public services, agriculture, forestry, etc.), observing that in these sites there are communities of ethnic groups Nahuatls, Totonacs, Otomies and Tepehuas who build their houses out of sheet metal, cardboard, plastic and wood where any natural phenomenon represents a true disaster. This article presents a brief description of Puebla mountainous region, the effect of human activities on landslides, the relationship between rainfall and disasters, and the analysis of the rainfall threshold that has triggered landslides, whose empirical estimated value is 100 mm/day obtained from the analysis of pluviometric information recorded several years in various meteorological stations in the study area.

Audience Take Away Notes

- They will know the physiographic characteristics of the mountainous region of Puebla, formed by mountain ranges of marine sedimentary rocks, totally or partially covered by igneous rocks
- They will confirm that rain is one of the main triggers of landslides in mountainous regions
- Civil engineers, geotechnics, geology, geophysics, hydraulics, hydrology, geomorphology, climatology and construction, among others
- The precipitation threshold value will allow the establishment of civil protection plans to evacuate the population located in vulnerable sites in mountainous regions with high rainfall.
- Drainage construction elements for slope stabilization in places with heavy rainfall, must be designed taking into account the extent of the storm, type of terrain and its inclination, and the amount of rainfall per day (trenches, horizontal drains, relief wells, filter galleries, etc.)

Biography

Professor Oscar Cuanalo is Civil Engineer (Benemerita Universidad Autonoma de Puebla), Master in Engineering (Universidad Nacional Autonoma de Mexico) and Doctor of Science (Universidad Martha Abreu, Cuba). He is currently professor-researcher at Universidad Popular Autonoma del Estado de Puebla, member of Mexican Society of Geotechnical Engineering and emeritus professor of European Geosciences Union (EGU). He has worked 23 years on Risks-Disasters due to Geotechnical-Geological Phenomena, published 5 books on landslides and 3 books on soil improvement (under-excavation and mortar injection techniques used in the Metropolitan Cathedral Geometric Correction), is referee reviewer for "World Journal of Civil and Construction Technology".



Martina Gaglioti

Geo-education-exploratory learning sessions on field and under water

Geo-education-exploratory learning sessions on field and under water

Our Planet is facing multiple challenges and to address them a multiperspective attitude is needed. On this perspective, the environmental education is a mission, which cannot be accomplished without getting your hands dirty, directly on field. This contribution is an overview of educational and field-based activities performed in the last few years (2021-2023) at the interface between freshwater and marine ecosystems, across the Italian peninsula and beyond. Considering how after the pandemic break a vibrant environment developed around Ocean Literacy and Man and Biosphere relationships all over the world, is particularly important to keep going on participative processes to address better informed decision-making procedures even in the near future. Protected areas are the privileged tool to make happen these kind of learning experiences, but a strong experience and a solid scientific background is needed to succeed in cutting-edge learning experiences. There are several connection points between landward and seaward environments, trying to understand them make possible a wider sight to enable restoration and recovery interventions where needed beside aware daily natural resources management where relevant natural heritage is present and need to be preserved even for future generations.

Audience Take Away Notes

- Marine and environmental sciences can dialogue in daily conservation practices. An integrated approach allow learner to gain experiences in a wider vision resembling the complexity of ecological systems
- Some practical insights from different kind of protected areas will be shared, with reference to specific actions developed accordingly to the extant conservation measures of the intercepted areas
- Some insights can be useful to develop further transboundary and transdisciplinary collaboration, as properly conceived environmental sciences practices should require
- The provided examples could represent interesting tips to develop other educational plans and to engage different stakeholders in the near future
- The practical experienced shared in this contribution represent even some success case studies which enabled the recognition of subsequent research programs and field-based interventions
- Some examples related to the herein shared experiences ameliorated the extant situation in some of the intercepted areas where some knowledge gaps were present, through an evidence-based educational approach

Biography

Dr. Martina Gaglioti is a marine ecologist, but even well-before she's a diver. She started officially to dive when she was 9 and then on her passion for nature and sea, she developed her academic and professional career. She graduated in Marine Biology in 2015 and specialized in Geospatial Analysis in 2017 and Project Management through a Master in European Studies in 2023. She served as individual consultant and expert for UNESCO and worked for research institutions such as Stazione Zoologica Anton Dohrn, CMCC. After several collaborations in the academic and research field she decided to focus more on the outreach and educational dimension of the scientific research, paying attention both to formal and informal education to reach as people as possible in what she considers "her educational mission".

She's also an AIOSS scientific diver and a certified SCUBA Instructor. She conducted research all over the world in Protected Areas, UNESCO Biosphere Reserves and interacted directly with some of the main experts of marine biology, diving and environmental education fields. Currently, her daily work is at the interface between marine and freshwater environments. She's really attracted by children curiosity and observation spirit. She likes arts and in particular drawings techniques to support whenever is applicable her scientific activities and research findings descriptions. She believes in transboundary collaborations and in the power of the sea to link people with different cultures and backgrounds. She published more than 200 research items, contributing even in local newspapers articles, social media information campaigns and public engagement sessions collaborating with NGOs, associations and local authorities even in foreign countries. She's a reviewer of peer-reviewed journals (JMSE, Remote Sensing, Land, Water, Sensors), she co-supervised a MSc thesis and advised some international team works in hackathon competitions (Open Sea Lab 3.0, WeKEO Hackathon).



Arun K Shandilya

Dr HSG University Sagar, India

The future of hydrocarbon gas reserve in vindhyan sedimenatary basin around Souther bundelkhand region, South Ganga Basin, M.P. India

The southern Bundel Khand region of the South Ganga basin is characterized by the occurrence of the hydrocarbon and helium gas in the rocks of the Vindhyan Super group, which were deposited in an early Middle to Late Proterozoic era in the Indian continent. This sedimentary basin is spread over an area of 5,00,000 sq.km right from Bihar, Uttar Pradesh M.P. Rajasthan regions. Due to creation of the new low marine basin, the preservation of insitu as well as continental organism along with rocks of prolific basin with their rich fossil fuel, in this region could be possible, and can be explore with the joint collaborative studies with CGWB, New Delhi and ONGC, DGH, NOIDA U.P. etc.

The rare has helium and hydrocarbon gases must have been generated over a great depth in the geological time scale, by the biological conversions and chemical reactions induced by the high pressure and optimum temperature. The gas must have been generated from humic palynofacies and minor sapropelic component by thermal cracking. In the Vindhyan sedimentary basin, around Jabera area near the North Narmada Son Fault (NNSF), the salt dome must have been injected and formed the domal structure, which is responsible for the formation of hydrocarbon and helium gas in the less deformed Vindhyan rocks and gases are accumulated in the part of domal anticlinal axes all around the Jaber- Sing Rampur dome in the Damoh Distt.

On the basis of geochemical analysis, it is remarkable to note that average values of helium contents varies from 0.34 % to 0.732 % along with the 72% to 99 % of methane and ethane, and minor amount of oxygen, nitrogen and CO₂ gases in the hydrocarbon rich zone are recorded during the geochemical and stable isotope analysis. It has been found in the stable isotop δ C13 value the values for the methane is - 43.6 per mil w. r. t. to - 54.9 per mil w.r.t. PDB and for the Ethane gas is --24.9 to --26.4 per mil w. r. t. PDB in the gas samples collected in the saturated sodium chloride solution in the glass bottles at various sites in Sagar & Damoh District. The occurrence of rare helium gas in the Hydrocarbon rich zone is reported first time in Jan, 2007 from the tube wells of Sagar Distt, which were geochemically and stable isotopically analysed in the labs of KDMIPE Dehradun & NGRI Hyderabad. The gaseous hydrocarbon analysis show the presence of moderate to low concentration of methane (C1) 1 to 104 ppb, Ethane(C2)-1 to 14 ppb, Propane(C3) 1 to 10 ppb, i- Butane (i C4) 1 to 9 ppb and n Butane (n C4) 1 to 8 ppb in the soil samples collected from different locations.

The Result of the adsorbed soil gas and stable isotopic analysis of Ethane gas in these samples δ C13 value are ranging from -24.9 per mill w.r.t. PDB and -26.9 per mill w.r.t. PDB are indicative that this gas is of thermogenic origin, which must have been formed at very high temperature & pressure condition in the deeper horizon of the Great Vindhyan sedimentary basin of an early Proterozoic (> 600 m.y.) period.

Keywords: Hydrocarbon, Helium, Sedimenatry Basin, Thermal Cracking, Thermogenic, Proterozoic, Domal Structure.

21-22^{SEPT}

DAY 01
POSTERS

JOINT EVENT ON
**GEOLOGY AND
CLIMATE CHANGE**



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Effect of projected temperature change on ambient air dispersion patterns - a case study from Eastern, Saudi Arabia

Air dispersion models such as AERMOD and CALPUFF are frequently used by scientists and engineers for assessing the environmental impacts of air pollutants' emissions from man-made activities. This is achieved via linking the release of pollutants from emission sources to the corresponding concentration levels in the ambient air around the sources. The predictions of air pollution patterns by these models are closely associated to the climate conditions including: air temperature, wind speed and direction, humidity, rainfall rates... etc. The climate conditions change due to the global warming phenomenon will most likely have an affect the dispersion patterns of air pollutants result from air dispersion models. Therefore, the main objective of this work is to investigate the effect of proposed air temperature change on the dispersion of Sulphur Dioxide (SO₂) using AERMOD model. To achieve this goal, emissions from five (5) industrial stacks, on twenty-eight (28) receptors in the study area (i.e. Dammam, Saudi Arabia) were considered for the period from 2010 to 2019 and future period of mid-century of 2040 to 2060 under different scenarios of elevated temperature profiles (i.e. +1°C, +3°C and +5°C) across averaging time periods of 1hr, 4hr and 8hr. The comprehensive literature search did not reveal any similar research in the selected study area. Results also revealed that the projected temperature increases of 1, 3 and 5°C lead to increase the modelled levels of SO₂ concentration by 0.04%, 0.14%, and 0.23% respectively. Results of the study showed that the modelled levels of SO₂ at the receiving sites under current and simulated future climactic condition still fall within the allowable limit of WHO and KSA air quality standards. The outcome of this work elucidates the degree of the effects of global warming and climate change on air quality and can help the policy makers in their decision-making, given the significant health challenges associated with ambient air pollution in Saudi Arabia.

Audience Take Away Notes

- Audience will be able to understand the effect of global warming on air dispersion models
- Audience will acknowledge the effect of predicted elevated temperatures on air dispersion models and take it into account when running AD models in the future
- Yes, this research that other faculty could use to expand their research or teaching
- Yes, this provide a practical solution to a problem that could simplify or make a designer's job more efficient
- Yes, it improve the accuracy of a design, or provide new information to assist in a design problem

Biography

Dr. Tawabini is a water and environmental specialist with more than 35 years of experience in academia, research and consultancy. He is currently an Associate Professor at King Fahd University (KFUPM), Dhahran, Saudi Arabia. Dr. Tawabini is leading the MSc program in Environmental Sciences in the university where he teaches several courses related to environmental pollution assessment and control. He supervised more 50 PhD and MSc theses related to various subjects on environmental pollution and water treatment. Dr. Tawabini published over 150 scientific papers in refereed journals and conference proceedings and received 7 US patents.



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Groundwater flow and transport modeling for assessing the coastal Managed Aquifer Recharge (MAR). A case study

In coastal aquifers, there is a natural freshwater-saltwater equilibrium relationship that can be altered by human action by reducing the discharge of freshwater into the sea as a result of pumping extractions. This subterranean advance of seawater can occur in different ways, the most frequent being: i) the horizontal advance of the freshwater-saltwater interface inward and ii) the vertical ascent in the form of a saline cone ("upconing") of the interface in favor of wells in which intensive pumping takes place.

Considering this process, this study aimed to identify the effect of Managed Aquifer Recharge (MAR) on upconing using mathematical flow and transport modeling, to determine an optimal MAR scenario for marine intrusion control, taken as a case study of the coastal aquifer of La Plana de Castellon (Spain).

As materials and methods, the necessary information was collected for updating the conceptual hydrogeological model, and, based on the said model; the data processing was carried out for its use in modeling with Visual MODFLOW Flex for the simulation of groundwater flow. Based on the results, the flow conditions were calibrated by the traditional trial and error procedure, in order to obtain a Normalized Mean Squared Error (RMS-N) equal to or less than 10%. Subsequently, SEAWAT, a code based on MODFLOW/MT3DMS, was used to simulate the three-dimensional flow of groundwater with variable density along with solute transport based on Total Dissolved Solids (TDS) concentrations and to identify both upconing like the recharge water plume of MAR. For these simulations, piezometric and hydrochemical information was available from a MAR test using wells and surplus surface water.

The groundwater flow model was obtained and considering the conceptual hydrogeological model, it was observed that the results were coherent, obtaining RMS-N values between 6.6% and 8.4%. Concerning the simulation of transport with TDS, this was carried out considering both a scenario without MAR and with MAR, to appreciate the recharge water plume and its effect on the system.

It was possible to verify that the water coming from the lateral groundwater inlets produces a natural attenuation on the system and that together with the MAR there is a positive and notorious effect on the quality of the aquifer water by reducing its salinity, in addition to producing a rise of piezometric levels. With this information, hypothetical scenarios were proposed taking into account different recharge flows and recharge duration, identifying the best configuration to achieve attenuation of saltwater intrusion on a shorter time scale.

Audience Take Away Notes

- The example presented in this study is the use of mathematical modeling to support decision-making. Modeling can be a very valuable tool because it allows you to compare different management models and check which one can bring more benefits
- The modeling makes it possible to study both processes that have occurred and are occurring, and also to predict their behavior under innumerable future scenarios

- The modeling can be applied to any field of knowledge. You have to look for software that meets the objectives of the modeling. Today there is a large number of open-access software
- Yes, this provide a practical solution to a problem that could simplify or make a designer's job more efficient
- Yes, it improve the accuracy of a design, or provide new information to assist in a design problem

Biography

Dr. Esteller completed her studies in geology at the Faculty of Sciences of the University of Granada, Spain, and obtained her Ph.D. from the same university. She carried out her postdoctoral studies at the University of Lisbon, Portugal. She entered the Autonomous University of the State of Mexico (UAEMex) in 1996, where she is currently a researcher-professor at the Inter-American Institute of Technology and Water Sciences. His lines of research have focused on three areas related to hydrogeology: groundwater contamination, flow and transport in the unsaturated zone, and aquifer remediation and protection. She has published more than 50 research articles in SCI(E) journals.



Ravi Kikar Sinha

Private Indian Researcher, India

A theory of great utility in earth science and space explorations

If two points are equidistant from a third point (their origin/precursor/ source) then, whatever variance and hence standard deviation exists for the two points for a given trait, is also a reasonably good estimate of variance/standard deviation at the third(their origin/precursor/source) thus, by looking at the site, we get the parameters of the source. Variance and standard deviation can be estimated from the theory of least square. This theory is of great utility, when the source is at a considerable distant and is beyond reach. It can also be used in the laboratory, to find out the internal composition of a specimen, by just looking at the characteristic on the surface. Using this formula, audience can learn.

Audience Take Away Notes

- Charecteristics of sun, other stars, galaxies etc by analysing radioastronomical, and computer assisted spectrophotometric and other data
- Geology: it can help in mining and petroleum explorations by finding exact locations where petroleum and other minerals are present
- It can be used as finding mood of volcanoes and earthquakes(early warning systems)

Biography

Ravi Kikar Sinha is a member, American association for the advancement of science, washington dc, USA. He has 10 copyrights on topics of sciences from the canadian copyright office, Quebec, Canada. He is a private Indian researcher.



Ravi Kikar Sinha

Private Indian Researcher, India

Artificial production of wood globally avoiding deforestation, to maintain oxygen- carbon dioxide ratio on earth

Plants and trees produce oxygen through splitting of water into oxygen and hydrogen. A hydrogen acceptor is there to receive the hydrogen produced and the oxygen is released in the environment. The oxygen released, keeps the carbondioxide oxygen ratio maintained on earth. The oceans also produce massive volumes of oxygen through their phytoplankton, in the light reaction of photosynthesis, using sunlight, chlorophyll, and water. Due to rapid cutting of trees in many forests, the source of this balancing oxygen is fast dwindling. By the artificial (in vitro) production of wood globally the need for cutting of trees can be avoided thereby conserving forests globally. Artificial production of wood can be achieved through manipulation of cambium in vitro (biotechnology). My hypothesis: if two points are equidistant from a third, and the third point happens to be their source/origin/precursor and both points have similar development, then whatever variance and standard deviation, exists for the two points (sites/products) in relation to a given trait, is also a reasonably good estimate of variance and standard deviation at the third. Therefore, if the variance at two points, equidistant from their source/origin/precursor is identical with the origin/source/precursor, then it is imperative that their development is similar/identical.

Audience Take Away Notes

- To make artificial profuction of wood, through mutation in cambial tissue, or some other biotechnological effort
- They should try to retard the rapid deforestation, globally

Biography

Ravi Kikar Sinha is a member, aaas, washington dc, USA. He has 10 copyrights from canadian copyright office, Quebec, Canada. He regularly prays for countries across the world for world peace and harmony.

21-22^{SEPT}

DAY 02

KEYNOTE FOURM

JOINT EVENT ON
**GEOLOGY AND
CLIMATE CHANGE**

How subsurface waters record the earth's history

Author supposes that formation waters inherit chemical composition of surface water from sedimentary basin. Salinity of ancient basins is a reason to explain the formation water (sedimentary water) composition in many cases. Hydrochemical analysis of lithological sections for every basin by excluding the factors in connection with infiltration and evaporation gives the possibilities to compare the waters of "sedimentary origin" in the geological time and space. The principal tendencies are the decreasing in Cl and Ca content during geological time and difference in water salinity between Northern and Southern Hemispheres.

Data on the distribution of strong brines (up to 200 g/l and above) in the Precambrian rocks of the Canadian, Scandinavian shields, crystalline massifs of the East European and Siberian platforms are widely known. Against this background, the data on the chemical composition of waters in the crystalline massifs of the African continent, where mainly fresh water is distributed, appear to be a sharp dissonance. Comparative study of these continents suggests that the geological history of the African continent has been particularly favourable for the accumulation of fresh and, in some cases, ultra-fresh (mineralization less than 0.1 g/l) waters and their preservation, despite the harsh arid conditions of the region. The snowball Earth hypothesis is suitable to explain this situation. Later the accumulation of fresh water on the African crystalline massifs occurred on the Ordovician glaciation in the period 440-420 million years ago. During this period, the areas of Gondwana, located in the Southern Polar zone, were covered with powerful glacial deposits. Hypersaline brines in sedimentary basins of the Northern Hemisphere are opposite to the fresh waters of African crystalline massifs and their peripheral sedimentary basins. Statistical hydrochemical parameters of the Northern American and Eastern European Platforms show their similarity. Decreasing in mineralization (from 300 to 200 g/l) was in connection with melting of ice and global evaporation processes that occurred on the Late Paleozoic time. Salt deposition works as a machine that removes salts from the hydrosphere.

Mesozoic hydrosphere was larger in volume than Paleozoic and water salinity was decreased dramatically. Salinity of formation waters are 30-150 g/l, Ca content is 5-10 g/l. Extended Mesozoic sedimentary basins are comfortable to study the influence of hydrothermal injection into sedimentary sections. Formation waters composition of Cenozoic Basins reflexes the diversity of sedimentary basins. Salinity of many basins is close to the Ocean salinity (35 g/l).

Formation waters record the processes of poles migration, climate changes and volume of hydrosphere. Transition of water to ice - removing fresh water from the hydrosphere and, in the contrary, opposite processes: origin of brines and later carbonate and salt deposition - removing Cl



Leonid Anisimov

Volgograd State University,
Russian Federation

and Ca from the sea water. These global events have important implications not only for modelling of the chemical history of the ocean and sedimentary basins, but also for the explanation of extinction periods, and the many aspects of geology that depend on the composition of the oceans and their peripheral basins.

Computer simulation of the offshore CO₂ geological sequestration in Smeaheia, Norway

Anthropogenic CO₂ release in the atmosphere comes from the use of fossil fuels that are extracted from deep underground reservoirs. Thus, it is natural to consider capturing and bringing CO₂ as the by-product of burning fossil fuels, back where they came from - in deep geo-sequestration reservoirs, particularly existing or abandoned oil and gas fields, and saline aquifers. This is the essence of CO₂ Geo-Sequestration (or CO₂ GS). This paper presents the results of the computer modeling of the two-fluid phase fluid flow and geomechanics of CO₂ injection and storage in the Smeaheia, Norway, CO₂ Geological Sequestration (GS) Project. The modeling aims to predict the effects of immiscible two-phase fluid flow involving saline water and supercritical CO₂ on the injectivity, flow, transport, and storability of CO₂ in the reservoir rocks in the Smeaheia field. The main emphasis of the modeling is to determine potential leakages through the caprocks above the storage reservoir and the Vette Fault, which bounds the reservoir laterally, due to induced stress and pore pressure changes. A 2D (two-dimensional) cross-section of the field based on geological and seismic studies was built and modeled using the Fast Lagrangian Analysis of Continua (FLAC) computer code. Overall, the simulation showed the viability of injecting and storing the CO₂ in the reservoir. The modelling predicted that the Vette fault system and the caprock can provide CO₂ sealing and potential barriers to prevent leakage of the sequestered CO₂.

Audience Take Away Notes

- Audience will learn about the fundamentals of CO₂ GS
- Audience will learn about the role of computer simulation to determine the viability of injection and storage in potential CO₂ GS reservoirs
- The presentation will provide participants with enhanced knowledge that will be helpful in finding opportunities for employment, research, and training in the fast-growing and evolving field of CO₂ GS



Marte Gutierrez

Civil and Environmental Engineering, Colorado School of Mines, Golden, CO 80101, United States of America

Biography

Dr. Marte Gutierrez is the James R. Paden Distinguished Professor of Civil and Environmental Engineering at Colorado School of Mines. He has held visiting professorships in China, Chile, France, Japan, Norway, South Korea, and UAE. He has published more than 365 publications. He is an Associate Editor of three international journals and Editorial Board Member of four other journals. He is the recipient of the Geotechnical Research Medal from UK's Institute of Civil Engineers, the Rock Mechanics Research Award and the Applied Rock Mechanics Research Award both from the American Rock Mechanics Association, and a Fullbright Scholarship. Dr. Gutierrez's main research interests are in Geomechanics, and Energy and Environmental Sustainability.

21-22^{SEPT}

DAY 02

SPEAKERS

JOINT EVENT ON
**GEOLOGY AND
CLIMATE CHANGE**



Jinsong Wu

Guilin University of Electronic Technology, Guilin, China, and University of Chile, Santiago, Chile

Environmental sustainability and intelligence as well as general green technologies

Although the term of green has been often used to refer to energy consumption reduction or energy efficiency by many people and literatures, green actually should refer to environmental sustainability in more general senses. Environmental sustainability issues have been important topics for recent years, which has impacted and will further impact individuals, enterprises, governments, and societies. Environmental sustainability is not simply regarding reducing the amount of waste or using less energy, but relevant to developing processes leading to completely sustainable human society in the future. The long term consequences of the relevant serious issues have not yet been fully forecasted, but it has been generally accepted in many communities that immediate responses are necessary. From 30 November to 12 December 2015, the 21th United Nations Climate Change Conferences of the Parties (COP 21) was held in Paris, France, as the a historical breakthrough and milestone towards securing the future Earth, a global agreement on the reduction of climate change, the text of which represented a consensus of the representatives of more than 193 countries attending it, which was a profound milestone for global environmental sustainability. Nowadays there is another significant tendency on data driven intelligence. This talk would discuss the history, technical issues, challenges, and new trends of data driven environmental sustainability and Intelligence. Further this talk will extend the view to general green technologies.

Biography

Jinsong Wu (IEEE Senior Member) received PhD from Department of Electrical and Computer Engineering, Queen's University, Canada in 2006. He won 2020 IEEE Green Communications and Computing Technical Committee Distinguished Technical Achievement Recognition Award, for his outstanding technical leadership and achievement in green wireless communications and networking. He is Vice-Chair Technical Activities (2017-2022), IEEE Environmental Engineering Initiative, a pan-IEEE effort under IEEE Technical Activities Board (TAB). He was the Founder and Founding Chair (2011-2017) of IEEE Technical Committee on Green Communications and Computing (TCGCC). He is also the co-founder and founding Vice-Chair (2015-present) of IEEE Technical Committee on Big Data (TCBD). He received 2017, 2019, and 2021 IEEE System Journal Best Paper Awards. His co-authored paper won 2018 IEEE TCGCC Best Magazine Paper Award. He was the leading Editor and co-author of the comprehensive book, entitled "Green Communications: Theoretical Fundamentals, Algorithms, and Applications", published by CRC Press in September 2012. He is the proposer and founding Editor-in-Chief (2022-present) for the international journal "Green Technologies and Sustainability" (GTS), co-sponsored by Elsevier and China Science Publishing & Media Ltd., jointly called KeAi.



Dlzar Al Kez

School of Mechanical and Aerospace Engineering, Queen's University Belfast, Belfast, United Kingdom

Navigating power system stability in the transition to 100% renewable energy: The impact of variable renewables

The global pursuit of a sustainable energy future is dependent on the integration of renewable energy sources, particularly variable renewables such as wind and solar power. Understanding the intricate dynamics of power system stability becomes critical as we seek to reach the ambitious target of 100% renewable energy.

Consider the example of the all-island of Ireland's power system, which is currently undergoing a significant transformation highlighted by the phased retirement of thermal generating and the rapid growth of variable renewable resources, predominantly wind. Renewable resources accounted for 43% of the island's energy usage by 2020. As of 2022, the All-Island system had proved its ability to handle up to 75% of instantaneous generation from non-synchronous sources, primarily wind and HVDC interconnection. While these results represent significant global progress, the path to even more ambitious decarbonisation targets necessitates additional evolution. Larger amounts of renewable energy will need to be accommodated inside the electricity system in the future. However, this transition is expected to create system low inertia, voltage, and strength challenges, particularly in weak parts of the network. These problems are expected to worsen with time.

In response to these challenges, system operators are continuously proposing various solutions to assist the wider integration of variable renewable energy sources. Among these solutions, Grid-Forming (GFM) converters and synchronous condensers are particularly promising. It is in this context that this webinar provides an overview of research study results and new dynamic solutions, with a focus on strategies for regulating Grid-Following (GFL) and grid-forming inverters. The solutions aim to address the challenges of integrating variable renewable generators into the power grid, enabling a more seamless and harmonious transition towards a cleaner, greener, and truly sustainable energy future.

Audience Take Away Notes

- Gain insight into the challenges of integrating variable renewables like wind and solar power into the power grid
- Attendees will learn about system inertia, voltage, and strength challenges that arise as variable renewable energy penetration increases
- Understand dynamic solutions involving GFL and GFM inverter control strategies for stable renewable energy integration

Biography

Dlzar Al Kez is currently a research fellow at Queen's University Belfast and an IET Professional Registration Advisor. He also holds the position of Assistant Editor at the Renewable and Sustainable Energy Reviews Journal. Dr. Al Kez received his PhD degree from Queen's University Belfast in 2022, with a research focus on power system dynamics and distributed generation. His research excellence has garnered multiple awards, including the best paper award, best PhD thesis award, and researcher plus award from Queen's University Belfast between 2020 and 2022. He also

received the excellent paper award from the KScien Organisation in 2021 and the best paper award at the 17th SDEWES conference in 2022. With over 14 years of combined academic and industrial experience, Dr. Al Kez served as a power manager at IQ Networks, a leading fibre optic internet provider company in Iraq. His membership and chartered engineer (CEng) status in the IET underscores his dedication to professional development and engineering excellence. Dr. Al Kez's publication record includes more than 30 conference papers, journal articles, technical reports, and a book chapter.



Gisela Cebrian

EDIT Research group, Pedagogy Departament, and Institut Universitari de Recerca en Sostenibilitat, Canvi Climatic I Transicio Energetica (IU-RESCAT), Universitat Rovira i Virgili, Tarragona, Spain

Sustainability competencies in education: Current trends, challenges and innovative initiatives

Climate change and sustainability challenges are global, complex and ‘wicked’ problems, which involve creativity, critical thinking, decision-making and value-based sustainability competencies. Transformative learning process where innovative educational practices, critical thinking, inter- and transdisciplinarity are promoted are fundamental. Interactive, learner-centred teaching and learning settings should be created; therefore, sustainability education asks for an action-oriented, transformative pedagogy, which supports self-directed learning, participation and collaboration, problem-orientation, inter- and transdisciplinarity and linking formal and non-formal learning to the development of key sustainability competencies.

Developing sustainability competencies amongst all levels of education is particularly critical to the development of sustainability literacy and individuals becoming positive change agents in their workplace and personal lives. While signs of progress in embedding Education for Sustainable Development (ESD) across education levels are plausible during the past decades, there is also an acknowledgement that what we have learned to date is not enough for dealing with the current challenge of sustainability and climate emergency. From early childhood to higher education, theoretical frameworks and practical efforts to embed ESD through whole-school approaches have been documented, however these practices tend to remain as niches and examples of good practice. This presentation focuses on presenting an overview of the state of embedment of sustainability competencies within education, identifying existing trends and challenges in the integration of ESD and presenting a collection of best practice and innovative educational initiatives, such as school climate assemblies, developed within the framework of the EDUCLIMAD project (TED2021-129854A-I00), which empower youngsters and their communities to co-create more sustainable futures.

Audience Take Away Notes

- Engage in the EDS and sustainability competencies discourse and existing frameworks
- Reflect on how ESD and sustainability competencies can be embedded and expanded through own research or teaching
- Learn from existing innovative educational initiatives that promote sustainability competencies and tackling climate emergency through the active participation of stakeholders
- Discover school climate assemblies as an innovative method and strategy to promote community learning and the co-creation of sustainability solutions at local and regional levels

Biography

Dr. Gisela Cebrian is a Serra Hunter Associate Professor in the Pedagogy Departament at Universitat Rovira i Virgili (URV). She is a member of the research group EDIT - Educational Transformation, Leadership and Sustainability. Her research interests include Education for Sustainable Development (ESD), teacher education, organisational learning, sustainability competencies, educational leadership and curriculum innovation. Through her previous research, conducted within the framework of competitive R&D projects, she has explored: the conceptualisation and evaluation of

sustainability competencies; the influence of student-centred approaches in sustainability competencies' development amongst students and more recently how school climate assemblies can lead to more sustainable futures.



Maria Angelica Mejia Caceres

Federal University of Rio de Janeiro, Brazil

Exploring teachers' needs and knowledge gaps in climate change education

This presentation delves into the motivations and expectations of teachers regarding Climate Change Education (CCE), while also highlighting their knowledge gaps in this area. By analyzing teachers' textual responses, the study identifies the topics that interest teachers, such as environmental education, politics, and pedagogy. The study uses Bloom's Taxonomy Action Verbs to categorize teachers' expectations according to different learning levels, finding that teachers want to enhance their knowledge of CCE, acquire cognitive competencies, and develop skills to apply teaching strategies based on pedagogic and environmental ethics.

The study also reveals the misconceptions and confusion that some teachers have about CCE. For example, some teachers mistakenly equated climate and weather, and others struggled to comprehend atmospheric pressure, climate factors, and elements contributing to CC. Nevertheless, some correctly identified phenomena associated with CC, such as cold waves, coral bleaching, and sea level rise.

These findings underscore the need for improved CCE for teachers, which could help address the complex and multifaceted issues surrounding climate change. Investing in continuous teacher education in CCE can equip teachers with the knowledge, competencies, and skills to create solutions, build networks, and share experiences related to CCE, thereby contributing to mitigating the global issue of climate change.

Biography

Maria Angelica Mejia-Cáceres is doctor in Science and Health Education of the Federal University of Rio de Janeiro, Brazil. She was a visiting research student in The Sustainability Education Research Institution (SERI) at University of Saskatchewan, Canada. She has a Master's in Education with emphasis teaching science at the University del Valle, a specialization in Social Management of the Pontificia Universidad Javeriana, in Cali, Colombia. Her research focuses on critical environmental education, climate change education, teacher education, educational policy analysis, and critical discourse analysis. Since last year, she has been working as a technical advisor for the climate change education program of the Niteroi Climate Secretary. At the same time, she is a researcher in the research groups Languages and Mediations in Science and Health Education at the Federal University of Rio de Janeiro. She is also a member of the Science, Education and Diversity research group and the Science, Actions and Health research group at the Universidad del Valle in Colombia. She has different publications about environmental education and teacher education. She is podcaster in Environment and Everyday Life in English, Spanish and Portuguese.



Vijayan Gurumurthy Iyer

Faculty (Climate Change, BIPARD), Bihar Institute of Public Administration & Rural Development (BIPARD) and Techno-Economic-Environmental Study and Check Consultancy Services, Proprietorship Business, Vijayan Gurumurthy Iyer GSTIN/UIN 33AIZPG9735D1ZW Gaya, Bihar, Pin Code: 823001, India

Environmental Health Impact Assessment (EHIA) process for the bio-medical Indian chromium leather tanneries towards sustainable source specific, generic and specific industrial development

In this Environmental Biomedical Science and Engineering (EBMSE) research note, environmental health impact assessment (EHIA) process is discussed for the Indian chromium leather tanneries towards sustainable development as Indian cotton Double Roller (DR) ginning industries are using Chrome Composite Leather Clad (CCLC) rollers. Sustainable industrial development can be defined as the industrial development which meets the needs of the present without compromising the ability and efficiency of future generations to meet their own needs. “Environmental Health Impact Assessment Process (EHIA process) can be defined as the systematic identification and evaluation of the potential environmental health impacts (health effects) of proposed projects, plans, programs, or legislative actions relative to the physical-chemical, biological, cultural, and socioeconomic components of the total environmental health including EBMSE. The objective is to conduct Environmental Health Impact Assessment (EHIA) process and green chemistry that is to systematically identify and evaluate potential environmental health impacts of CCLC rollers used in Indian CCLC Double Roller (DR) ginning industries with relative to the physical-chemical and biological can be referred as entitled “natural or biophysical environment” and the cultural and socioeconomic environment represents entitled “man-made environmental components” of the total environment. Most of the cotton ginning operations are performed by using DR ginning machines which serve an important role in the Indian cotton ginning industries. The rollers used are made of CCLC covering fixed to a shaft. The CCLC contains about 18,000 to 36,000 mg/kg (ppm) (1.8 %-3.6%) of chromium particles. The chromium stabilizes the CCLC by cross linking the collagen fibres in chromium leather tanning industries. Chromium salts, especially chrome alum and chromium (III) sulfate are used in chromium-tanning of leather. The EBMSE research is conducted to investigate specifically on chromium (III) and Chromium (VI) and health effects of the workers. Chromium tanned leather contains between 3 to 5% of chromium, which is tightly bound to the proteins. For certain types of projects, such as nuclear power plants, it may be necessary to address psychological impacts on nearby residents as per reference entitled “Can Change Damage Your Mental Health?” Nature, Volume 295, January 21, 1982, pp.177-179 for the necessity to address psychological impacts on nearby residents and reference entitled “An Environmental Health Impact Assessment (EHIA) process” published by World Health Organization (WHO) titled ‘Health and Safety component of Environmental Impact Assessment ‘from WHO publication, Copenhagen in 1987’. Although the form of chromium used for tanning is not toxic hexavalent variety, there remains interest in the management of chromium in the tanning industry such as recovery and reuses, direct / indirect recycling, use of less chromium or ‘chrome-less tanning is need to be practiced to better manage chromium in tanning with respect to green chemistry. Chromium salts or chromates in contact with skin, lungs and stomach result in dermatitis and lung and esophagus cancer and brain tumor among Indian gin and textile mill workers and the working condition of Indian chromium leather tanning industries and leather related facilities. The chemicals that are employed chemicals in leather industries are hazardous and need to

be free from hazardous nature that is green chemistry. Based environmental health impact assessment (EHIA) results and realizing the importance of green chemistry and working condition in Indian tannery and chrome leather related facilities should be sustainable for the environmental development of our country. Brief or occasional contact may not pose a problem. Potassium dichromate is a chromium salt or chromate and is a common metal making up a significant part of the earth's crust. The most common home exposure of chromate is leather. As per the EBMSE research, the majority of leather goods, including shoes and gloves, are tanned with chromates. It is necessary to avoid chromate tanned leather gloves, and leather shoes. Vegetable tanned leather and eco-friendly gloves and shoes or plastic shoes and Oak Bark-Tanning in the traditional manner is recommended compare to chromate tanned leather. Investigation results are provided on environmental and biotechnological chromium contamination in lint cotton, edible plants, and bioremediation of chromium contamination and role of bacteria in detoxification of chromium pollution and contamination in the unsafe chromite mines (fifteen number of Odissa Mining Plants) and chromium pollution in drinking water and in crops such as rice, wheat, mushroom, potato. The main EBMSE investigation is adverse health conditions of the workers and local environment that being polluted by toxic hexavalent and trivalent chromium and still being employed in Indian leather industries. For those with shoe dermatitis from chromate and leather, wearing heavy socks or reducing perspiration and moisture may help to reduce dermatitis. The amount of chromium found in all skin layers due to chromium permeation through human skins in diffusion cells. In ginning factories, when the seed-cotton is processed in DR ginning machine, the lint cotton is contaminated with hexavalent and trivalent chromium dust of about 140 to 1990 mg/kg (ppm), Cr (VI) and Cr (III) which is carcinogenic substance against the safe limits of 0.1 ppm.

Ion chromatographic method and atomic absorption spectrometry method are employed for determining chromium content in all samples and Chromium (VI) found more with increased total chromium concentration in samples due to increasing level of application of potassium dichromate and is found cancer among all skin dermatitis workers. The percentage of chromium found during the cotton ginning process due to persistent rubbing of CCLC over stationary knife the chromium particles are adsorbed into lint cotton such that the spun yarns and woven fabrics get contaminated about 100 to 200 ppm which according to eco-standards should not be more than 0.1 ppm. The CCLC rollers used in cotton roller ginning machines get powdered during the ginning process. As chromium is a specific dust, gin and mill workers and residents are directly exposed to this carcinogenic substance and are vulnerable to environmental health hazards. To offset this problem, pollution-free eco-friendly washers/rollers both for laboratory and commercial studies have been fabricated and experimented. Biomedical research attempts are made to alternate dust-producing grinding CCLC ginneries (EBMSE by Vijayan Gurumurthy Iyer, 2018). Environmental Health Inventory (EHI) serves as the basis for evaluating the potential environmental health impacts both beneficial and adverse of a proposed action. Environmental Health Impact Statement (EHIS) describes the affected environmental health or environmental health setting without the project. Green Design and development of the EHI is an initial step in the EHIA process. It is concluded that EHIA process is conducted for certain projects, plans, programs, legislative actions, policies in the project planning and decision-making process. As the EBMSE research has over looked in to the chemicals that leather tanneries use in the past and present specifically in chromium and public health and occupational health hazards, sustainable policy measures should be needed to control environmental pollution and contamination in source specific, generic and industrial specific Indian leather tannery environment.

The paper also concluded that the earth system contains functional and cross functional interaction, interconnected and interrelated system of set of activities that have been already breached beyond climate and weather safe limits for global climate system, biodiversity, freshwater, nutrients and different kinds of air, water, land (LAW) pollution (Vijayan Gurumurthy Iyer, 2023).

Audience Take Away Notes

- Environmental Health Impact Assessment (EHIA) Process
- Unsafe chromium pollution and contamination
- Zero emission chromium pollution and contamination in leather
- Occupational Health Hazards and Safety Impact Assessment in Indian Leather tannery environment
- The organizational planning and decision making process as considerations of Four E s, Engineering, Economics, Environment and Ethics
- The Earth system contains climate and whether functional and cross functional interacted, interconnected and interrelated system of set of activities that have been already breached beyond safe limits for climate, biodiversity, freshwater, brackish water, nutrients and different kinds of air, water, land (LAW) environmental pollution. The audience can able to learn about climate and weather impact assessment process and sustainable addiction, behavioural health and Psychiatry for sustainable development

Biography

Dr. Vijayan Gurumurthy Iyer studied Environmental Science and Engineering with Specialization in Environmental Biomedical Science and Engineering (EBMSE) at the Indian School of Mines, Dhanbad, India and post graduated as Master of Technology, M.Tech., in 1998. He received his Ph.D. degree in Environmental Science and Engineering in 2003 at the same institution. He has served in Indian Council of Agricultural Research (I.C.A.R.) with effect from 22.05.1985 (FN) to 10.02.1998 (FN). In the year 2006, he joined the post-doctoral fellow under research guidance of Prof. Nikos E. Mastorakis at the World Scientific and Engineering Academy and Society (WSEAS), Athens, Greece. After ten years of postdoctoral research supervised by Prof. Nikos E Mastorakis, WSEAS, Athens, Greece, he obtained the position of Professor at the Institute of Technology, Haramaya University, Harar, Ethiopia, East Africa. He has published more than 445 research articles in recognized journals and conference proceedings with his h.index of 55 and total number 3000 citations in his credit.



Puran Ch Joshi

Department of Geography, SSJ University, Almora, Uttarakhand, India

Climate change and its impacts on rural areas of central himalaya: Some experiences from Almora district, Uttarakhand, India

Himalaya is one of the most sensitive as well as fragile parts of the earth. It is the newest as well as the highest mountain system too. In order of their origin Himalayas are divided into three parallel ranges. In a sequence from north to south, they are known as great Himalaya, lesser Himalaya and Shivalik (outer most) respectively. The middle part of this lofty mountain also known as Central Himalaya. This part is the most populous region of the Himalayas. In this region, the impression of human and his work is visible from the prehistoric period. Thus, Central Himalaya is the focal point of culture and civilization since ancient time. Likewise, the other parts of the globe Himalayas are also facing human induced climate change. Himalayan glaciers are retreating. According to a data, the retreatment rate of Gangotri glacier, origin of river Ganga, is 19 meter per year. For the past few years, this part of the Himalayas has been affected from erratic rainfall and rise in temperature. Forest fire disaster is very common in throw-out the year. As a result of this water scarcity is very common in past few years. Agricultural system is also affected, even in some areas people are not growing the wheat crop because of lack of rainfall in winter season. It is a well-known fact that climate change has severely affected the poor countries and their people. In rural areas of the central Himalayas, people who are not capable to earn much for their livelihood, they have become completely dependent on the food grains given by the government. People are forced to migrate in big cities where they lead a low standard of living due lack of resource. Present paper is based upon the observations of local people. A series of interview is taken from senior citizen living in villages. These people have their own indigenous knowledge. They utilised this knowledge in agriculture and conducting their daily life. They talk about the agricultural production which they used to grow in their fields. In recent past entire system is changed due to the change in weather cycle. Present paper also discusses the impacts of climatic change in culture, traditions and life style in rural Himalaya. Paper also traces out the situation of out -migration in the research area due to poor situation of agriculture. Present paper will help in understand how developing societies are facing problems due to climate change.

Key Words: Central Himalaya, Climate Change, Migration, Indigenous Knowledge.

Biography

Dr. Puran Ch. Joshi has a Master's degree in Geography from Kumaun university, Nainital, Uttarakhand, India. He obtained his doctoral degree in 2011. During this period, he worked in different research projects regarding glaciology, disaster management, democracy & sustainable management. Further he worked in teacher education as a resource person of geography. Presently he is working as faculty in department of geography, SSJ university, Almora, Uttarakhand, India. He has published more than 30 research papers and many article.



B Venkateswara Rao

Water Technology Centre, PJTS Agricultural University, Hyderabad, Telangana, India

Raising of groundwater levels is the key for the rejuvenation of rivers

There has been a tremendous utilization of groundwater resources in the last three to four decades. Globally, groundwater supplies half of drinking water and nearly 70% of irrigation water. Two thirds of worlds groundwater is abstracted in Asia alone. India is the highest user of groundwater in the world. Higher abstraction of groundwater has brought down the water tables in peninsular India of hard rock regions so deep that, rivers are not receiving any contribution from the aquifers during the lean period. The research indicates that the deeper the groundwater table, the more the recharge of the rainfall water to the ground producing little or no runoff from the watersheds leading to reduced inflows to the reservoirs. With the increased interventions of the up streams coupled with drastic reduction in the base flows, rivers are drying up. To reverse the situation the only way forward is to increase the water use efficiency in the irrigation by implementing micro irrigation systems.

The strategy should be, adopting the water and soil conservation technologies by first utilizing the soil water optimally, then we can go for surface water irrigation through smaller scale to larger scale structures including the farm ponds, irrigation tanks medium and large-scale dams in that order. Groundwater irrigation option should be exercised as a last resort. Various groundwater modeling studies in the Deccan Plateau of India suggest that groundwater utilization for the irrigation purposes must be reduced to the half of the present usage. This can be done only through the adoption of sprinkler and drip irrigation methods. For this purpose, change of cropping pattern from the present water intensive crops to less water intensive crops depending on the water availability is necessary.

For all these activities more investments are to be made by the farmers in the agricultural farm sector, which can happen only when the farmer's income is doubled to his investments. Empowering of farmers cannot happen unless there is a proper support price for their agricultural produce and the society should spend more to get the farm produce. Only with the extra money in the farmer's hand, it is possible to invest in water saving technologies and help bringing groundwater table to original level (pre - 1980's) leading to rejuvenation of the rivers.

Audience Take Away Notes

- In South Asia, the situation is similar to the cases explained in this paper. Audience if happen to work in this region, they can straight away apply the conclusions drawn from this paper
- They include reducing the use of ground water by adopting water and soil conservation methods and micro irrigation methods and become more resilient towards climate change
- Yes, the finding in this research that the deeper the groundwater table, the more the recharge of the rainfall water to the ground producing little or no runoff from the watersheds leading to reduced inflows to the reservoirs can be tested in other parts of similar Hydrogeologic settings
- List all other benefits

- o Drying up of rivers in arid and semi-arid regions is a global phenomenon. With the increasing effects of climate change felt in these regions such as recurring droughts and floods, it is pertinent to understand the interaction between surface water and ground water so that climate Resilient plans are more sustainable

Biography

Prof. B. Venkateswara Rao did is Ph.D. in water resources at Jawaharlal Technological University Hyderabad (JNTUH) and masters in Geophysics at Andhra University Visakhapatnam India. Initially he worked in the field organizations exploring the ground water. later joined as faculty of water resources at JNTUH and rose to the rank of professor and Director at the Institute of Science and Technology, JNTUH. His areas of research include ground water exploration using geophysical methods, Interaction between ground water and surface water, ground water quality and water resources. He published nearly 200 scientific papers and received several National and international awards.

**Karen Wendt**

Sustainable Finance and SDG Economics, Switzerland

The impact of carbon disclosure on the market value of financial industry companies

This presentation shows the results of a study that assesses the carbon disclosure practices of financial institutions and companies listed in the MSCI World based on a mixed-method content and panel regression analysis. Previous empirical investigations could not relate performance of financial institutions and insurance companies with risk or impacts to society. The guiding research question for this work is how and to what extent are financial institutions and insurance companies disclosing carbonrelated information.

Biography

Karen Wendt is the editor of the Sustainable Finance Series with Springer Science and Business Media, a series dealing with new concepts in Economy, Leadership, Investment, Finance, Strategy, Management, Exponential Tech, and Behavior. Karen is also a serial entrepreneur. Her mission is to merge economy and business with purpose and passion to implement the Sustainable Development Goals (#SDGs) using Choice Architecture and applying Theories of Change. She combines investment, strategy, ideation and mediation knowledge with investment and finance as well as network and movement building skills. She pioneered in the creation of the Equator Principles, the Gold Standard in investment banking for achieving human rights assessments and respect in business, de-risking assets from extra-financial risks and crafting a more integral approach towards decision-making, opportunity recognition and positive impact creation.



Ahmad Behrouj Peely^{1*}, Zargham Mohammadia¹, Mostafa Naderi²

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Climate change in a mountainous region with high spatial variation of precipitation, Zagros, Iran

The impact of climate change in Zagros region, which makes 40% of Iran's water resources, was investigated in two 30-year periods (i.e. 2021-2050: near future and 2051-2080: far future) under three Shared Socio-economic Pathways (SSP1-1.9, SSP2-4.5 and SSP5-8.5). Thus, daily outputs from multi-model ensemble were downscaled using LARS-WG. Furthermore, climate condition and drought were analyzed using two indices, SPI and eRDI. The average annual precipitation in comparison to that of baseline in the near and far future periods increases by 24% and 28% under SSP1-1.9 scenario, decreases by 6% and 9% under the SSP2-4.5 and experiences a rise of 3% and a drop of 1% under SSP5-8.5, respectively. The coldest place with the highest altitude observes the greatest changes in precipitation and temperature while warmer places with low altitude might not bear much change. Such results could indicate, at least to some extent, the dependency of the rate of temperature rise and precipitation change to altitude. The difference between SPI and eRDI is more pronounced in warmer places and under SSP5-8.5 scenario while based on aridity index some semi-arid areas are at risk of becoming arid under SSP2-4.5, which could be crucial in water resources management and agricultural sectors.

Audience Take Away Notes

- The strong aspect of this manuscript is the key findings of altitude dependency of climate change impact in Zagros region with great significance in terms of water resources
- The impact of climate change under three Shared Socio-economic Pathways (SSP1-1.9, SSP2-4.5 and SSP5-8.5), was investigated using LARS-WG
- The degree of climate change effect on precipitation and temperature was explored
- Climate condition and drought were analyzed using two indices, SPI and eRDI
- This research should be of interest to a broad readership including those interested in climate, meteorology, environmental concerns, agriculture, and water resources management

Biography

Dr. Ahmad Behrouj Peely studied Hydrogeology at Shiraz University, Bulgaria and graduated as MS in 2013 and PhD in 2018. Currently he is a postdoc researcher at the same university investigating the impact of climate change on groundwater resources. His articles are mostly focused on interdisciplinary research including the interaction between hydrogeology with other fields such as hydrology, environment, engineering and climate change.



Sudip Basack¹, Ghritartha Goswami^{2*}

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A laboratory study on the geohydraulic properties of sand under saline water submergence

Rising sea levels have a significant impact on saltwater intrusion, which has been researched for decades. The issue gets significantly worse when the effects of overpumping and sea level rise are coupled. It is yet in the preliminary phases to consider real sloping seaward borders of saltwater concerns in unconfined aquifers. From the theoretical analysis of previously done studies it is noticed that when there is excessive extraction of ground water from coastal aquifers the saline water moves towards the extraction area by significantly altering the hydraulic conductivity of the coastal soil. The saline water intrusion is more sensitive to pumping and recharges rates of ground water as compared to aquifer properties. In the theoretical analysis it is found that there are various methods available for preventing saline water intrusion, out of them extraction of ground water through Qanat-well structure linked with artificial recharge supported by percolation ponds and recharge wells is effective method to minimize saline water intrusion in areas having significant annual precipitation, superior hydraulic conductivity and low depth of fresh groundwater. Another efficient methodology found in theoretical analysis which prevents saline water intrusion was Abstraction De-salanisation & Recharge methodology. This method is found to be efficient where extraction rate of ground water is more. The present study emphasizes on the engineering properties of sand which get affected by the saline water. For analyzing the affects of salt water on sand laboratory experiments (tests on Specific gravity, Relative Density, Hydraulic Conductivity) were conducted. The tests were first conducted on normal sand which was not submerged in concentrated saline water solution and results were observed for comparison. In case of relative density it is observed that the maximum and minimum dry density of sand decreases with the increase in salt particles. On the other hand the relative density increases with increase in salt water concentration and submergence period of sample. In case of permeability it is observed that the overall hydraulic conductivity of the sample decreases significantly with increases in concentration of salt and submergence period. From the present study it can be said that when salt particles gets dissolved in sand by either filling up the voids between two sand particles or by forming a layer on each sand particle the engineering properties of the sand drastically changes. Further detail study is required to determine whether the salt particles gets dissolved in sand by either filling up the voids between two sand particles or by forming a layer on each sand particle.

Audience Take Away Notes

- Major causes of Saline Water Intrusion
- Discussion on hydraulic conductivity
- Outcomes of extensive laboratory investigation to determine saline water interface
- Preventive design Recommendation

Biography

Ghritartha Goswami, BE, M.Tech. is a professional civil and water resources engineer, currently a Ph.D. scholar at NERIST, Arunachal Pradesh, India. Formerly an Assistant Professor & HoD (i/c) at SITM, Assam, India. He has published more than thirty papers in different reputed international and national journals. For his remarkable accomplishment

in his profession, he was recently named a Young Scientist by the International Scientist Awards.

Sudip Basack, PhD, FIE, M.ASCE is a civil engineering professional with vast academic experience at responsible senior positions in India and abroad. He published more than 100 technical papers in reputed journals and conferences and is recipient of several research awards at national and international levels. He is an active reviewer of numerous top-class international journals. He has supervised more than 10 research students at postgraduate (Masters and PhD) levels and executed sponsored research projects in different Universities. He has undertaken several academic visits in many countries including USA, UK, Germany, Australia, New Zealand, Singapore, China, etc.



Alexey Yu Kazansky

Geological Institute of the Russian Academy of Sciences/Leading researcher,
Moscow, Russia

Lomonosov Moscow State University/professor, Moscow, Russia

Fairy tales and facts about the environmental magnetism of the Siberian loess sequences

The Siberian loess province is comparable in area to the well-known Chinese loess plateau. However, until now, this area remains practically unexplored. Since the publications by Chlachula et al. (1997-2003) western researchers have formed a stable opinion that the formation of the magnetic properties of the Siberian loess-soil series proceeded by the same mechanism as in the Alaskan loess-soil series. This opinion is mainly based on the data from Kurtak section which characterizes the northernmost (excluding edoma deposints of Lena river and Chukotka) area of loess distribution in central Siberia and, therefore, these data should not be extended to the areas of Western and Eastern Siberia located to the south. The buried soils in Western Siberia are well developed (up to the chernozems) and their magnetic characteristics indicate the presence of superparamagnetic grains and, consequently, active pedogenesis. Thus, concentration dependent rock magnetic parameters in those strata follow "wind-vigour" mechanism (like in Alaska: whereas the structural-sensitive parameters follow the "pedogenic" mechanism (as in China). Such a superposition of mechanisms we singled out as a "Siberian mechanism". This mechanism works throughout Western Siberia, and in areas with different climatic conditions, one can trace a different contribution of the "pedogenic" and "wind-vigour" components to the total magnetic signal. Buried soils In Eastern Siberia are less developed, so the "pedogenic" component in "Siberian" mechanism is weaker. In Early Pleistocene soils of Eastern Siberia, "Siberian mechanism turned to pure "pedogenic", whereas in Central Siberia, the "wind-vigour" mechanism changed to the "Siberian" mechanism with a pronounced "pedogenic" component. The research presented here was supported via research grant from the Russian Science Foundation No. 19-17-00216

Audience Take Away Notes

- This presentation will contribute to a better understanding of the complexity of the problem of formation of the magnetic properties of loess-soil series in different climatic conditions and will help to provide a correct climatic interpretation of their changes
- Is this research that other faculty could use to expand their research or teaching? The results of these studies will allow a new approach to the study of loess-soil series and provide more complete information for use in courses on environmental magnetism and climate change
- This provides an opportunity to create new regional climate change models

Biography

Prof Kazansky studied geology and geophysics at the Novosibirsk state University, Russia and graduated as MS in 1977. She then joined the research group of Prof. Pospelova at the Institute of Geology and Geophysics, Siberian Branch of Russian Academy of Sciences (IGIC-SB RAS). He received his PhD degree in 1989 at the same institution. He received his Full Professor degree in 2002 at the Institute of Geology, Siberian Branch of the Russian Academy of Sciences. In 2015 he obtained the position of an Professor at the Geological faculty of Lomonosov Moscow State University and the position of Leading researcher in Geological Institute of the Russian Academy of Sciences. He has published more than 200 research articles in SCI (E) journals.



Evdokimov Alexander Nikolaevich

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Magmatism as a factor in the generation and redistribution of hydrocarbons in the sedimentary cover of the barents-kara shelf

The process of formation of hydrocarbons is associated with the warming of the subsoil. In this case, intensive conversion of scattered Organic Matter (RM) into oil and gas takes place. This process is activated at the depths of immersion of the initial oil horizon to a depth of 2-3 km. Here temperatures reach 60-200 ° C. However, such temperatures could be reached at lower depths, due to the influence of intrusions of magmatic melts. In particular, the melt of the main composition creates a temperature field around the intrusive body up to 1000 ° C. The thickness of precipitation subjected to thermal action of magmatic melts could be quite high, since the temperature in them decreases tangentially depending on their thermal conductivity and distance from hot intrusion. If traps are widely developed in the region, then obviously, due to increased glandularity, these magmatic bodies of the main composition have increased magnetization and according to this feature, they are distinguished on maps of an abnormal magnetic field. The Barents-Kara Shelf is one of the largest oil and gas provinces in the world. The oil and gas potential of the region is proved by the results of geological exploration, drilling of 33 deep wells, identification of a series of oil and gas bearing structures, the presence of fields: Prirazlomnoye oil, Shtokmanovsky, Rusanovsky and Leningradsky gas condensate fields, penetrated by Rosneft well Universitetskaya oil fields on the Kara Sea shelf – “Pobeda”. Due to the high costs of conducting exploratory seismostratigraphic profiling and subsequent drilling to verify the detected anomalies, it seems relevant and expedient to perform preliminary zoning of the shelf area based on the data of the already performed remote mapping of anomalous magnetic and gravitational fields of the Barents and Kara Seas.

In order to perform preliminary forecast zoning of the Barents-Kara shelf area, we had a series of different-scale maps of gravitational and magnetic anomalies compiled as a result of geological survey geophysical work within the framework of the projects: Gosgeolkart 1000 and Gosgeolkart 200 of different generations. They were reduced by us to 1: 5,000,000 scale maps.

In the region, especially in its island part: the Novaya Zemlya archipelago, the Svalbard archipelago and Franz Joseph Land, the magmatism of the main composition of the Paleozoic and Mesozoic stages of tectonic-magmatic activations is manifested. Late Devonian basalts are mapped in the Timan-Pechora region and on the Novaya Zemlya archipelago. In the form of covers and intrusions of diabases, they act as tuffs of Devonian oil and gas deposits.

Perm-Triassic traps are manifested on the Taimyr Peninsula, Dixon, in the Polar Urals, on the Severnaya Zemlya archipelago.

In the gravitational field, linear anomalies of destructive influence on hydrocarbon deposits are distinguished, which spatially coincide with the Kola-Kaninsky zone of deep faults, the "North Siberian threshold," the boundaries of the raised basement block in the Franz Joseph Land area and other structures.

On the map of magnetic anomalies, especially in the eastern part of the region, intense alternating anomalies form extended zones and chains of local maxima with the predominance of a positive sign. Weak negative

anomalies occupy positions between strong positive ones. In the area of the outcrops of basalt covers and sills on island land within Franz Joseph Land, the magnetic field is represented by differentiated positive anomalies. In accordance with our proposed interpolation methodology, these are zones of destructive effects of magmatism on hydrocarbon deposits.

Jurassic-Cretaceous intrusive and cover formations are common on Franz Joseph Land, on Svalbard, and in the eastern waters of the Barents Sea. Thus, magmatism can contribute to the generation and migration of hydrocarbons inside the sedimentary formation into reservoir and structural reservoirs, and contribute to their accumulation. On the other hand, magmatism is able to dilute hydrocarbon deposits until their complete disappearance.

Audience Take Away Notes

- The presentation will help in the interpretation of magnetic exploration and gravimetric exploration data to predict the oil and gas potential of a region
- The report will help improve the profitability of geological prospecting operations on the continental shelf of the Arctic region
- The methodological approach to the interpretation of geophysical fields will allow a new assessment of the prospects of the Barents and Kara shelf for hydrocarbons

Biography

Dr. Evdokimov studied and graduated from the Geological Department of St. Petersburg State University, specialized in mineralogy. He worked at the Arctic Geology Research Institute, traveled to field work in Polar Yakutia, the Novaya Zemlya archipelago, the Chukotka Peninsula, Franz Joseph Land, and the Svalbard archipelago. Nowadays he is professor at St. Petersburg Mining University. The main areas of scientific activity: minerals of the Arctic, diamond deposits, magmatism. He had opened the Sigurd copper-silver deposit on West Spitsbergen Island. He is the author of more than 100 scientific works, including monographs: "Volcanoes of Spitsbergen", "Fanerozoic magmatism and minerals of Arctic Eurasia."



S M Mahdi Niktabar

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Effect of infill thickness in the joint under cyclic loads

Many of the joints may have been filled by transported material or joint walls being weathered. In comparison to the joint blocks the filling material is much weaker as it is generated by rock fracturing or weathering of joint block material. Infilled joints exist in many cases of rock masses and failure is related to low resistance of infill materials. In order to assess the effect of infill thickness on shearing plane, two types of planar and non-planar synthetic infilled joints are prepared. These joints are prepared with plaster of Paris and tested under CNS boundary condition. Sample size of joints is kept at 298*298*125 mm. In between the joints; infill material of thickness 5mm and 10mm is placed to create infilled rock joints. These joints were tested under different boundary condition at different initial normal stresses (P_i) by keeping frequency and amplitude constant under cyclic shear load, using servo controlled large scale direct shear apparatus. Test results indicate that there is no change in normal stress under CNS on the shearing plane and it remains constant at P_i for planar infilled joint. But for non-planar joints it changes with changing in the infill thickness and number of shear cycle. Infilled material thickness and initial normal stress play important role on cyclic shear behavior of non-planar infilled joints under CNS boundary condition. Moreover, experimental tests indicated that there is no effect of CNS boundary condition on shear behaviour of infilled joints at both high normal stress and infill thickness.

Biography

Dr. Niktabar studied mining engineering at the Yazd University, Iran and graduated as MS in 2006. He then joined as lecturer in Mining group at the Ardakan University (IAU). He received her PhD degree in 2016 from Indian Institute of Technology Delhi (IITD). After postdoctoral In Chungnam National University (CNU) in South Korea and Institute of Geonics (UGN) Czech Academy of Sciences, he obtained the position of an Assistant Professor at the UGN. He has published many research articles in journals and international conferences.



Sonia Boudjabi^{1*}, Haroun Chenchouni²

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Comparative effectiveness of three bio-solids on carbon sequestration in a soil located in a semi-arid region

The challenge of combating global warming is a major one for scientific researchers. An issue of great interest in the scientific community's debate. As a result, several reflections have been made, targeting different ways to implement Carbon Capture and Storage solutions in the soil to reduce greenhouse gas emissions. Carbon is an essential element of greenhouse gases. It becomes imperative to relocate this mineral from the atmosphere to the soil and vegetation. Carbon is stored temporarily in the biomass and permanently in the soil structure. According to authors (Fonseca et al 2011), If this sequestration is accompanied by the implementation of adequate practices, the reduction of GHGs in the atmosphere will decrease by 30%. In this sense, assessments of the carbon storage potential in the soil show that its sequestration is associated with agricultural practices. Increasing plant production is an effective means of integrating carbon into plants via the mechanism of photosynthesis. A two-pronged strategy to meet the needs of the population in terms of food requirements and to mitigate the emission of CO₂ into the air. In Algeria (A North African country), the area of arid and semi-arid regions is very large, if we focus on developing effective measures to improve plant productivity in these regions will contribute significantly to the mitigation of global warming. This objective can only be achieved through soil fertilisation in these regions. This practice, if based on the use of several biosolids, will give us a vision on the type of effective fertilizer to apply in soils of arid and semi-arid regions. In this aim, that this study was made. It aims to compare and evaluate the addition of three doses of biosolids (Biochar, poultry manure, sewage sludge) on some crucial soil functions (carbon sequestration, soil humidity, Nitrates, pH, EC). The applied doses for each selected biosolids are Do = control without fertilizer, D1 = dose 20g/pot, and D2 = 60g/pot. The experimentation was conducted in a green house in the region of Tébessa, a semi-arid region located in eastern Algeria. The results showed that the soil carbon content improves with the addition of sludge (2.16±0.20%) and biochar (5.9±0.15), while the content of manure (2.83±0.10) was lower. Nitrate content also increases more with sewage sludge 17.60mg/g soil followed by biochar 7.36mg/g soil. The electrical conductivity of the soil with biochar was 1444±0.002µS/cm, with manure 1369 ± 0.32 µS/cm while with sewage sludge it was 630±0.08. We conclude that biochar has a decisive role in carbon sequestration compared to the other two fertilizers.

Keywords: Carbon Sequestration, Biochar, Sewage Sludge, Poultry Manure, Global Warming Sample.

Audience Take Away Notes

- This research allows scientists to know which of the recycled organic fertilizers are the most effective in carbon sequestration
- This research will be used to convince farmers to use the biosolids without fear. The use of different fertilizers provides information about the right choice of biosolid. The use of different biosolids provides information on the appropriate choice of these fertilisers

Biography

Boudjabi Sonia is a doctor at department of Nature and Life Sciences. University of Tebessa, The doctor is specialised in the field of biological sciences. The doctor is specialised in soil/plant interactions. Several of her research projects have addressed different areas including, the effect of environmental stresses on plant physiology and production, Also, the evaluation of organic waste (biochar, sewage sludge, poultry manure.) on soil fertility and plant production and heavy metal accumulation. She has participated in three national research projects. She has participated in several national and international seminars. She has published ten research articles.

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Participants List

Notes

*"We wish to meet you again at our
upcoming events next year..."*

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