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Scientific Tracks & Abstracts

(Day 1)

Judith M Tisdall, J Earth Sci Clim Change 2017, 8:8 (Suppl)
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Winter weeds add organic matter to soil in orchards

Judith M Tisdall
La Trobe University, Australia

Fruit trees need soft stable soil (with plenty of organic matter) in the tree-line to enable feeder roots to grow and take up water and nutrients in summer. Why does a plant bother to produce roots? The plant uses energy, carbon, nutrients and water to produce the roots. Why? The plant needs roots for uptake and storage of nutrients and water, anchorage and production of hormones and phytoelexins (defense against pathogens). Organic matter (OM) helps to supply most of these needs and ranges from living plants and animals (>0.25 mm diameter), to highly decomposed humic materials (<2 µm diameter). OM provides: (1) Nutrients to plants, (2) Nutrients, carbon and energy to the many organisms in soil, (3) Buffers soil against rapid changes in chemistry, (4) Acts as slow-release fertilizer and (5) Improves soil structure. The rhizosphere (near the root surface) supports a large population of organisms; all part of OM. Winter weeds are an easy way of adding OM to soil in the tree-line. Living roots of weeds continually exude simple organic materials, then die and are replaced by new roots. The grower should allow weeds to grow in the traffic-line in winter but kill them with herbicide in summer, so they will not compete with the tree roots for nutrients, water and space. The grower should slash dead weeds in the traffic-line and throw them onto the tree-line as mulch. Soil animals gradually mix the organic mulch with the soil and avoid tillage. The mulch also decreases evaporation from the surface and protects the soil from heavy rain and lethal high temperatures in summer. This enables feeder tree roots to grow in soft stable soil and the trees to produce high yields.

Biography

Judith M Tisdall has experience in basic and applied research in soils. She was awarded JK Taylor Medal for excellence in research and communication (2012). Her 52 papers have been cited 3487 times in the scientific literature (HI=18). She was the first to recognize the mycorrhizal effect on soil aggregation. She led a project on soil management for crops in Indonesia that enabled farmers to double their incomes. She contributed to new soil management for fruit trees on Tatura Trellis. She is an Editor-in-Chief of *Soil & Tillage Research* and is a Member of Editorial Board of *Agronomy*.

J.Tisdall@latrobe.edu.au

Notes:

Dragutin T Mihailovic, J Earth Sci Clim Change 2017, 8:8 (Suppl)
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Kolmogorov complexity based measures applied to the analysis of different river flow regimes

Dragutin T Mihailovic
University of Novi Sad, Serbia

Scientists in different fields study behavior of rivers, which is significantly influenced by human activities, climatic change and many other factors that change mass and energy balance of the rivers. Influenced by the aforementioned factors, the river flow may range from being simple to complex, fluctuating in both time and space. Therefore, it is of interest to determine the nature of complexity in river flow processes, in particular in different parts of its course that cannot be done by traditional mathematical statistics which requires the use of different measures of complexity. It seems that one of the key problems in hydrology is that instead of use of complexity measures in analysis of river flow, hydrologists rather use traditional statistical methods, which are not usually adequate since they are mostly based on assumptions which cannot find a niche in complex systems analysis. We have used the Kolmogorov complexities and the Kolmogorov complexity spectrum to quantify the randomness degree in river flow time series of seven rivers with different regimes in Bosnia and Herzegovina, representing their different type of courses, for the period 1965-1986. We have calculated the Kolmogorov Complexity (KC) based on the Lempel-Ziv Algorithm (LZA) (lower-KCL and upper-KCU), Kolmogorov complexity spectrum highest value (KCM) and overall Kolmogorov complexity (KCO) values for each time series. The results indicate that the KCL, KCU, KCM and KCO values in seven rivers show some similarities regardless of the amplitude differences in their monthly flow rates. The KCL, KCU and KCM complexities as information measures do not see a difference between time series which have different amplitude variations but similar random components. However, it seems that the KCO information measures better takes into account both the amplitude and the place of the components in a time series.

Biography

Dragutin T Mihailovic is a Professor in Meteorology and Environmental Fluid Mechanics at the University of Novi Sad in Serbia. He was the Visiting Professor at University at Albany, The State University of New York at Albany, USA, Visiting Scientist at University of Agriculture, Wageningen, Netherlands and the Norwegian Meteorological Institute, Norway. He has more than 100 peer-reviewed scientific papers in the international journals in subjects related to land-atmosphere processes, air pollution modeling and chemical transport models, boundary layer meteorology, physics and modeling of environmental interfaces, modeling of complex biophysical systems, nonlinear dynamics and complexity. He has edited and wrote seven books. He was the Member of the Editorial Board of Environmental Modeling and Software (1992-2010) and Reviewer in several scientific journals. He was the Principal Investigator in many international projects with USA and several European countries.

guto@polj.uns.ac.rs

Notes:

George Chilingar et al., J Earth Sci Clim Change 2017, 8:8 (Suppl)
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Origin of Ice Ages

George Chilingar[1], O G Sorokhtin[2], L Khilyuk[3], M Lackpour[4] and Wennan Long[5]
[1]University of Southern California, USA
[2]Institute of Oceanology of Russian Academy of Sciences, Russia
[3]Rudolf W. Gunnerman Energy and Environmental Laboratory, USA
[4]California State University Long Beach, USA
[5]Lederhos Engineering Consulting, USA

The near-surface temperatures of the Earth are strongly affected by the precession angle (Ψ). Precession, in a revolving body, occurs due to the deviation of its mass distribution from the complete arrival symmetry. Precession angle affects the Earth's climate. Decrease of the precession angle is accompanied by a noticeable cooling of the climate. Glaciation emerges as soon as the Earth's average temperature reaches some critical value. As a result of the interaction between the Moon and Earth during the Pleistocene time, slow (but orderly) climate cooling episodes occurred periodically. The cooling periods lasted about 100,000-120,000 years and magnitude of cooling was 8-10°C. After the formation of thick ice covers, the climate warmed up by the same amount after a few thousand years. Glaciation degraded just as rapidly. Thus, Sorokhtin et al. (2010) were able to forecast the climate changes in the future. In the future (2020), despite releases of atmospheric gases, there will be a severe cooling down period.

Biography

George Chilingar is an American-Armenian Professor of Civil and Petroleum Engineering at the University of Southern California (USC). He has received his Bachelor's degree and Master's degree in Petroleum Engineering and PhD in Geology, all at USC. He has published 72 books and over 500 articles on geology, petroleum engineering and environmental engineering.

Gchiling@usc.edu

Notes:

Enrique Posada et al., J Earth Sci Clim Change 2017, 8:8 (Suppl)
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Analysis of the temperature changes in the Aburra Valley between 1995 and 2015 and model based on urban, meteorological and energetic parameters

Enrique Posada, Andrea Cadavid and David Robledo
INDISA-HATCH, Colombia

There is a perception among the inhabitants of the Aburra Valley Region, that the zone has been suffering big temperature raises in the last years, especially in the last decade. To give perspective about this issue, the authors have gone through the available information about temperature changes on three meteorological stations and have correlated it with a set of variables of urban, climatic and energetic nature with the intention of developing an approximate model to understand the temperature changes. Raises in the mean temperature, based on the linear tendencies were estimated on 0.47°C for the 20 years between 1995 and 2015; 60% of the raise is due to the local activity and 40% due the impact of global warming. Nevertheless it is a complex behavior, which has oscillations. In order to visualize and model the changes, it was necessary to linearize the behavior and understand the relation between the measuring stations, its geographical position and their altitude above the sea level. On the most representative station of the urban impact, the linearized temperature behavior was correlated with the mentioned variables. The differences between the temperatures and their linearized changes were acceptably correlated with global and local climatic influences. Significant results allowed understanding the city impact and its energetic performance on the temperature.

Biography

Enrique Posada is a Mechanical Engineer, completed his Master's degree in ME from the University of Maine, USA (1973). He holds Master's degree in Film Critics and Diplomas in Technology Management at University of Sao Paulo, Brazil and in Corporate Environmental Management at CDG. He was the Director of Research and Development for Nubiola Colombia Pigmentos S.A., with responsibilities in environmental issues, the development of three new production plants and numerous studies and developments in the various chemical and physical processes. He has also worked at Hatch Indisa S.A., a project engineering company, as a Project Manager and Specialist in Environmental, Energy and Fluids Topics.

enrique.posada@hatchindisa.com

Notes:

Eko Budi Lelono, J Earth Sci Clim Change 2017, 8:8 (Suppl)
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Pleistocene climate of Indonesia

Eko Budi Lelono
LEMIGAS, Indonesia

Most researchers agree that Pleistocene is characterized by glacial and inter glacial periods which are strongly related to dry/cool and wet/warm climates. Apparently these are reflected on their pollen records. The period of dry climate (glacial climate) is characterized by abundant Gramineae pollen, whilst the period of wetter climate (interglacial climate) is indicated by an increase of coastal and mangrove palynomorphs but greatly reduced frequencies of Gramineae pollen. On the contrary, previous works on the Pleistocene sediments of Java indicated high abundance of grass pollen along this age marking drier climate condition. This paper publishes the study which is intended to evaluate paleoclimate of Java and other area of Indonesia during Pleistocene. For this purpose, some well samples from East Java and Papua were collected. Standard laboratory preparation was employed to extract pollen from the cutting samples. This study applies quantitative method which allows detail climate change interpretation. This study shows that Pleistocene of East Java is characterized by abundant grass pollen of *Monoporites annulatus* which may correspond to the period of expansion of savanna vegetation coinciding with glacial period. Moreover, it is indicated by abundant charred Gramineae cuticles which are derived from burning grass. This might have been caused by extreme heat which could relate to the volcanic activities existed in East Java. Slightly different record appears in Papua which shows repetition of dry/wet condition or low/high sea level. The moist climate related to the phase of sea level rise is marked by abundant brackish pollen which possibly represented interglacial period. It is also supported by the increase of peat swamp and freshwater palynomorphs. On the other hand, dry climate representing glacial period is defined by significant decrease of these brackish and freshwater elements.

Biography

Eko Budi Lelono has completed his PhD in 2000 from Royal Holloway, University of London, UK. Currently he is a Senior Researcher in the Exploration Division of R&D Center for Oil and Gas Technology "LEMIGAS", a government research institution under the Ministry of Energy and Mineral Resources. He has published more than 25 papers in reputed journals and has been serving as an Editorial Board Member of repute.

ekobl@lemigas.esdm.go.id
ekobudilelono@gmail.com

Notes:

Taehoon Koh et al., J Earth Sci Clim Change 2017, 8:8 (Suppl)
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Energy saving remediation of lubricating oil-contaminated soil by microwave thermal desorption technology

Taehoon Koh, Donggeun Lee and Hanju Yoo
Korea Railroad Research Institute, South Korea

Thermal treatment is one of the effective methods to rapidly treat the oil-contaminated soil. However this method costs much due to the high energy consumption comparing with other conventional treatments. Microwave is recently regarded as an energy source to enhance the energy efficiency for the thermal treatment of the oil-contaminated soil. In this study, the feasibility of microwave thermal desorption technology was investigated to treat the polluted lubricating oil-contaminated soil. Microwave thermal desorption technology has been recently developed in Korea as a technically-effective as well as cost-effective technology for the remediation of lubricating oil-polluted soil. This technology uses microwave and microwave absorber as an energy source to enhance the energy efficiency for the thermal treatment of the lubricating oil-contaminated soil. Based on a series of field test results from this study, it was found that microwave thermal desorption technology can substantially reduce the remediation cost of oil-contaminated soil with low electric power consumption and contribute to low CO_2 emission.

Biography

Taehoon Koh has completed his PhD from Purdue University, USA. He is a Civil Engineer and Chief Researcher studying new construction materials and methods at Korea Railroad Research Institute. He has developed eco-friendly construction materials (concrete), fast construction technology for concrete structure and low-carbon remediation technology for polluted geotechnical materials. He has published more than 90 technical papers, registered over 20 patents and received paper awards and research awards.

thkoh@krri.re.kr

Notes:

Govindasamy Agoramoorthy, J Earth Sci Clim Change 2017, 8:8 (Suppl)
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Small dams mitigate climate change in drylands

Govindasamy Agoramoorthy
Tajen University, Taiwan

India is one among the many water-starved nations of the world and it increasingly faces declining surface and groundwater resources while the usage continues to escalate aggressively in recent decades. Although the annual monsoons bring enough rain, most of the rainwater cannot be harvested and stored due to inadequate water storage facilities. The world water use has tripled since the 1950s, so politicians have met this increasing water demand by building more big dams that alarmed environmentalist due to various negative side effects that range from loss of farmlands to repatriation of millions of displaced people. So, the question is, can big dams resolve all the looming water shortages and climate change consequences? What about building more eco-friendly small dams across all rivers? Can they mitigate climate change? A small non-profit agency in India has assisted over 1,000 villages in the semi-arid regions of Gujarat, Rajasthan and Madhya Pradesh States to build cost-effective check dams in rivers to harvest rain water for three decades. Water saved through the check dams not only transformed the infertile dry lands into productive agricultural lands but also increased ground water recharge ultimately benefiting the environment. This model has remarkable potential to be replicated in developing countries to reduce irrigation water stress and river water conflicts.

Biography

Govindasamy Agoramoorthy is a Distinguished Research Professor at Tajen University in Taiwan. His research ranges from environment to sustainable development. He has carried out research in Asia, Africa and South America for over 30 years. He serves as the Editorial Board Member of *Journal for Nature Conservation* (Elsevier) and Associate Editor of *Frontiers in Environmental Science*. Between 1989 and 1993, he served as a Visiting Scientist at Smithsonian Institution (Washington, DC). He also serves as Tata Visiting Chair in India and has authored 25 books, 80 book chapters and 250 research papers published in peer-reviewed journals.

agoram@tajen.edu.tw

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Work shop

(Day 2)

Alexander Trofimov, J Earth Sci Clim Change 2017, 8:8 (Suppl)
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Alexander Trofimov

International Scientific Research Institute of Cosmoplanetary Anthropoecology, Russia

Aqua-space suit as new geotechnology and universal human preventive mean during of heliophysical and climatic changes

We believe that at sequence of climatic and heliophysical events of last time, the main role have our magnetosphere. Accordingly the buffering properties of the geomagnetic field, which protects biosystems from excess solar proton-electron beams, are decreasing. Our main aim was the development at these conditions of preventive non-medicinal geotechnologies. It is shown, that our new technological means, so as informational holograms and drinking water, patented by ISRICA in Russia, has helioprotective properties and contributes to significant positive inversion of the functional dependence of activity of many human functional systems on heliogeophysical impacts. The non-medicinal means on the basis of drinking water treated light-hologram's impact in the weakened geomagnetic field, which reduces the excess heliomagnetotropic reactions of a man and promotes prevention of crisis states (on an example of patients with hypertension) was developed and successfully tested. Treatment of drinking water by informational holograms in the weakened geomagnetic field, in our opinion, leads to such changes in its nanoclusteral structure, energy-information capacity and bio-catalytic activity that provide heliomagnetoprotective effect in relation to a man on the systemic and organism levels.

Biography

Alexander Trofimov has completed his Doctor Diploma in Novosibirsk State Medical University in 1973 and degree of Doctor of Medical Sciences in 1998. He has served as Professor (1999), Academician of International Academy Energy-Informative Sciences (2001), Academician of ABI, USA (2010), General Director and Chief of Scientific Council of International Scientific Research Institute of Cosmoplanetary Anthropoecology (ISRICA), named after academician V.P. Kaznacheev (1994-2016) and Chief of Laboratory Helioclimatopathology of Science Center of Clinical and Experimental Medicine of Siberian Department of Russian Academy of Medical Science (until 2010 year). His basic research interests include heliobiology, cosmic anthropoecology, geoecology, geophysics, helioclimatopathology and preventive medicine.

isrica2@rambler.ru

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Coal fires a major source of greenhouse gases: A forgotten problem

Hartwig Gielisch
DMT GmbH & Co. KG, Germany

Coal fires seriously pollute the environment in several states of the world. Today most coal fires are manmade and emerge from illegal or unprofessional mining activities. The most disastrous coal fires of the world currently occur in China and India. In China the program "Big Step Forward" in the beginning of the 60's together with inefficient small scale mining is the main reason of the 750 coal fires in China, where almost 200 m of excellent, near surface coal were burned in uncontrolled coal fires. In India disregard of standards with regards to coal fire prevention is the reason of the burning coal fields. The Jharia Coalfield in Jharkhand started burning in 1916 and burns this year for 100 years. General data on the volume of coal, which burns in Indian coal mine, are not available. In general, coal fires start as result of unprofessional or illegal mining activities in open pits and uncontrolled, inactive coal mines by self-combustion of coal. Self-combustion is mainly controlled by the grain size of the coals, in other words the smaller the grain size the higher the risk of oxidation and subsequent temperature build-up. Many coal fires burn underground with variable supply of oxygen. Hence, the coal does not burn completely like in power plants, but it smolders in the underground. Emissions from these smoldering fires and an incomplete combustion of the coal create dust and greenhouse gases such as NO_X, CO_2, CO and CH_4. These emissions pollute the soil, groundwater and the atmosphere. Coal fire experts discuss since years the percentage and the cumulative influence of coal fires on global warming and climate change. Until now the percentage of greenhouse gases resulting from coal fires is unknown. The quantification of this percentage is a future duty of firefighting companies and organizations.

Biography

Hartwig Gielisch is an Exploration Geologist, studied at the Ruhr-University Bochum, Germany. Since more than 20 years he works as Geologist and Exploration Manager in natural resource exploration projects, mainly searching for hard coal and lignite. He is a qualified/competent person for natural resource estimation reports and registered as European Geologist (Certificate No. 752) with the European Federation of Geologists EFG, Brussels, Belgium. Since 2006, he works in India, exploring several coal fires and has extinguished fires together with Coal India Ltd.

hartwig.gielisch@dmt-group.com

Notes:

Yuri Yevdokimov, J Earth Sci Clim Change 2017, 8:8 (Suppl)
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Economic evaluation of climate change impacts: Extreme weather events

Yuri Yevdokimov
University of New Brunswick, Canada

Extreme weather events such as floods, storm surges, hurricanes, snowstorms, thunderstorms, tornados, droughts, heat/cold waves and others are among the most pronounced impacts of climate change. It is a commonly accepted knowledge that frequency of extreme weather events is increasing due to climate change which causes an increasing monetary damage to economic systems. In this study, extreme weather events are classified and their major attributes are discussed. Accordingly various statistical techniques to derive relationships between those events and their attributes are reviewed. As well, various methodologies to estimate economic impact from extreme weather events are analyzed in terms of their strengths and weaknesses. Main goal of this study is to design a model that connects economic monetary loss from extreme weather events due to climate change to its attributes in order to be able to predict future losses and to find the threshold for investments in mitigation and adaptation measures.

Biography

Yuri Yevdokimov is a Professor at the University of New Brunswick, Fredericton, Canada. He has completed his degrees in Economics and Engineering. He holds a joint appointment in the Departments of Economics and Civil Engineering. His research interests lie in the field of sustainable development and climate change impacts particularly sustainable transportation and climate change impacts on regional economy. His work has been published in academic journals and conference proceedings. He has more than 20 publications, one monograph, three textbooks, 15 refereed journal articles and nine chapters in books are among these publications. Currently he teaches in undergraduate and graduate programs in Economics and Civil Engineering at the University of New Brunswick and conducts research in the areas of climate change impacts on transportation, energy economics and political economy of emerging economies.

yuri@unb.ca

Notes:

Ganesh C Bora, J Earth Sci Clim Change 2017, 8:8 (Suppl)
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Sustainable transfer of concepts for global adaptation of smart farming to mitigate climate change due to agriculture

Ganesh C Bora
Mississippi State University, USA

Optimized the use of chemicals and fertilizer by adapting precision agriculture (PA), has positive economic and environmental impact and increase in crop yield. PA technology is component of smart farming resulting in reduction of GHG emissions, aiding in mitigating climate change impacts. Similar technology with adaptive modifications/customization can be used in developing countries. Policy makers along with scientist, academicians and progressive farmers in South and South-East Asia have substantial influence on development of modern agricultural methodologies. The technology is there and some of the large farmers have started to use it for economic benefits. The adaptation of analytic techniques with importance of Q certificate, carbon balance, livelihood adjustment due to change in climate is being studied in Bangladesh, India, Thailand and Vietnam. The impact of global change research by practicing PA technology with advanced mechanization is assessed by reducing agricultural inputs and its effect on CHG emission in these countries. The impact is substantial in terms of crop yield increase as well as on the environment.

Biography

Ganesh C Bora is an Associate Professor of Precision Agriculture and Machinery Systems at Mississippi State University in USA. He is the Chair of USDA Committee NCERA180: Precision Agriculture Technologies for Food, Fiber and Energy Production. He conducts research in mitigation of climate change, telemetry, UAS, data management, precision planting, energy savings through auto-guidance and sensing techniques for VRT, renewable energy. He was the Director of NDSU's Bio-Imaging and Sensing Center from 2010 to 2016. He has received Superior Paper and AE50 award from ASABE. He has maintained excellent global presence, received patent in Kazakhstan and conducted workshops in Vietnam, Thailand, India and Bangladesh; besides teaching Advanced Agricultural Technology Management in Kazakhstan. He has co-chaired the Mechanization and Precision Agriculture committee in Engineering and Technology Innovation for Global Food Security in South Africa. He has received his PhD from Kansas State University, Manhattan, KS, USA.

gcbora@abe.msstate.edu

Notes:

Muftah H El-Naas, J Earth Sci Clim Change 2017, 8:8 (Suppl)
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A practical approach to CO_2 sequestration: Reactions with high salinity water

Muftah H El-Naas
Qatar University, Qatar

Carbon dioxide is known to be a major contributor to global warming and climate change and hence has an adverse effect on environmental sustainability. CO_2 is emitted by various activities associated with industrial processes and the burning of various types of carbonaceous fuels such as coal, oil and gas. Over the past few years, there has been a considerable amount of interest in carbon capture and storage (CCS) as an option to mitigate the harmful effects of CO_2 emissions. This study evaluates a new approach to the capture and sequestration of CO_2 through reactions with high salinity water in the presence of an alkaline agent. Processes such as the Solvay process have been successful in utilizing the reactions of CO_2 with ammoniated high salinity water to sodium bicarbonate. This process, however, suffers from several drawbacks such as inefficient contact mechanism and the need for the regeneration of ammonia as alkaline catalyst in the process. Such drawbacks have been addressed through developing a new, inert particles reactor system that offers efficient mixing and stable operation. At the same time, carbon dioxide is reacted with high salinity water in the presence calcium hydroxide instead of ammonia to provide the alkalinity needed for the reaction of CO_2 and NaCl. The new process and reactor system were able to achieve high CO_2 capture efficiency (up to 99%) and effective reduction in water salinity (up to 40%), while storing the CO_2 in a stable solid form, namely sodium bicarbonate. The new process can utilize any alkaline solid waste and the inert particles reactor system can be used to capture CO_2 from different sources such as natural gas or flue gas.

Biography

Muftah H El-Naas is a QAFCO Chair Professor in Chemical Process Engineering at the Gas Processing Center, College of Engineering, Qatar University. He has completed his BASc degree in Chemical Engineering from the University of British Columbia, Canada, MEng and PhD in Chemical Engineering from McGill University, Canada. He has previously served as Chair of the Chemical and Petroleum Engineering Department, Director of the Petroleum Science and Engineering Graduate Program and Director of Research Funding at the UAE University. He has authored more than 150 papers in international journals and conferences, in addition to several book chapters and patent applications. His area of expertise includes CO_2 capture and sequestration, biotechnology, water treatment and purification, membrane separation and plasma technology. Most of his recent research work focuses on the development of new, environmental-friendly technologies for the oil and gas industry.

muftah@qu.edu.qa

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