Biomolecular and Sedimentological attributes revealed a new look of the late Miocene Himalayan Foreland Basin

Speaker: Dr. Biswajit Roy
Date and Time: 11 AM, July 8, 2021 (Thursday)
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Meeting number: 159 264 5474
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During 10-5 Ma, the low latitude areas of the world witnessed a major shift in ecological condition marked by a transition from a forest-dominated to a grass-dominated ecosystem. The change in global vegetation was thought be restructured primarily by aridification and a significant drop in atmospheric pCO_2 levels. Indian subcontinent also witnessed such major shift in ecosystem and the record is preserved in the fluvial sediments that were deposited in the basin developed in front of the rising Himalayas. Most of the reconstructions were based on bulk organic carbon and proxies such as soil carbonates, pollens that have inherited limitations and are susceptible to change. Using a combination of robust organic molecular compounds, inorganic proxies and sedimentological attributes, we established that the ecological shift was also controlled by the regional landscape and geomorphic conditions. Despite variation in vegetation composition along the Himalayan foreland, the depositional system was primarily thought to be fluvial in nature. However, molecular fossils extracted from foreland sediments of eastern Himalaya suggested episodic contributions from marine sources within a fluvial-dominated environment. Such depositional conditions are distinct from those found in other time-equivalent deposits. The lack of physical barriers and the formation of several depressions on the eastern part of the Indian subcontinent aided the entry of seawaters from the Paleo-Bay of Bengal as sea-level increased.

About the Speaker

Biswajit received his undergraduate degree in Geology from Burdwan University. Subsequently, he was selected in Integrated MS-PhD program in IISER Kolkata, and received his PhD degree in Geological Sciences from the Department of Earth Sciences at IISER Kolkata, where he worked with Prof. Prasanta Sanyal. He is now working as a Research Assistant at IISER Kolkata. Biswajit has expertise in organic and inorganic biogeochemistry, stable isotopes, pedology, and sedimentology. His primary research interests lie in understanding the biogeochemical cycles, organo-mineral interactions, paleo-ecological and paleo-hydrological studies. At IISER Kolkata, he also pioneered the development of an experimental protocol for compound-specific stable isotopic studies of organic molecules. In his short academic career, his unique approach of integrating field and geochemical proxies have led him to publish several research articles in prestigious journals such as EPSL, Sedimentology, Paleoclimatology and Paleoceanography, among many others. Biswajit has also received several awards from various funding agencies around the globe, including JpGU, EGU, IGC, INQUA, and Goldschmidt.

Optical and Geochemical Paradigms of Coal Metamorphism with a Note on Secondary Microbial Coal Bed Methane generation from Bituminous Rank

Speaker: Dr. Santanu Ghosh
Time: 4 PM, July 8, 2021 (Thursday)
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Meeting number: 159 151 6329
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Tectonism and related deformation episodes leave permanent streaks on the structure and texture of organic matter and coal can record the peak metamorphic events within its microstructure. My present research aims on elucidating the effects of tectonic deformations on optical and geochemical characteristics of the Rangit Valley coals of Sikkim, India. The intense deformation induced by the Himalayan orogeny metamorphosed the Gondwana coals of the fold-thrust belts to anthracite rank. To portray those effects, less metamorphosed and relatively tectonically less affected bituminous coals from the Raniganj and the Jharia Basins are considered for a comparative research. I employ micropetrography, Raman, FTIR and X-ray photoelectron spectroscopy along with δ13C and δ15N values to document the responses of organic matter to the thermo-stress coupling effects of tectonism. My research encompasses on recording optical and geochemical transformations with coal metamorphism with these proxies. My research has a broad scope in synthetic graphite production and investigating the influences of coal structure on caking ability of coals and plausible conversion mechanisms of non-coking coal to coking coal.
Additionally, I take interest in hydrocarbon assessment of prospective source rocks through pyrolysis, addition of synthetic clays and pyrites. The origin of coal bed methane and shale gas and their geochemical paradigms draw my attention. The stable isotopic disparities of gas components and formation water from these unconventional hydrocarbon resources and their relations to rank, geochemistry and secondary alterations attract me to develop microbially enhanced coal bed methane and shale gas production strategy from productive basins of India.

About the Speaker

Dr. Santanu Ghosh is a researcher in the field of Coal Geology, Coal Bed Methane, Organic and Stable Isotope Geochemistry. He completed his Ph.D. in Applied Geology from Indian Institute of Technology (Indian School of Mines) Dhanbad in March 2021 under the supervision of Prof. Atul Kumar Varma. During his Ph.D., Santanu received an opportunity to participate in the prestigious Occupational Traineeship program offered by the University of Queensland, Australia, in 2017. He published a total of nine articles in the reputed Sci-indexed journals and five articles in non-Sci journals till date. Santanu did his M.Sc. in Applied Geology from Presidency University, Kolkata, in 2015. He visited Orebro University, Sweden, for collaborative research works in stable isotope geochemistry for his M.Sc. thesis in 2015 under the expertise of Prof. Alf Ekblad. He received the DST-INSPIRE Scholarship from 2010 to 2015 for his academic excellence, which supported the funding of this collaboration in Sweden. He also qualified for Lectureship (Net) in Earth Atmospheric Ocean and Planetary Sciences held jointly by UGC-CSIR in December 2014. Moreover, he graduated from Presidency College, University of Calcutta, in 2013.