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Application of Markov chain and entropy analysis for cyclicity analysis of sedimentary sequence, an example from the Kolhan basin, Jharkhand, India

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Lithofacies succession in Chaibasa-Naomundi Basin of the Proterozoic Kolhan Group, Jharakhand has been studied descriptions, petrographic investigation and their vertical packaging has been done for assessing the sediment depositional framework and the environment of deposition. Six lithofacies arranged in two genetic sequences have been recognized within the succession. The result of Markov chain analysis indicates that the deposition of the lithofacies is Non-Markovian process and represents asymmetric fining-upward non-cyclicity. The chi-square test has been done to test of randomness in hypotheses for lithofacies in a succession. Two types of entropies are related to every state; one is relevant to the Markov matrix expressing the upward transitions (entropy after deposition) and the other relevant to the matrix expressing the downward transitions (entropy before deposition). The energy regime calculated from the entropy analysis showing maximum randomness suggests that deposition is by quick rapid flow which gradually changes to slow flow by changing the depositional pattern from deltaic sandstone to lacustrine shale deposit as a result of sediment bypassing giving rise to non-cyclicity in the sequence.

Biography

Shipra Sinha is a final year master student of the department of Geology and Geophysics at the Indian Institute of Technology, Kharagpur, enrolled in its 5yr Integrated M.Sc course in Applied Geology. She is a recipient of MITACS Globalink International Research Internship Fellowship in 2014 for the summer internship in Canada. She was selected for Summer Research Fellowship Program in 2013 by Indian Academy of Science (IAS), India. She has successfully completed her M.Sc dissertation under the supervision of Prof. S das, Geology and Geophysics, IIT Kharagpur.

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