Geophysical Research Abstracts
Vol. 17, EGU2015-4035, 2015
EGU General Assembly 2015

Kosi megafan: Sub-surface stratigraphy, sediment provenance and paleoclimate proxies

Rajiv Sinha (1), Manish Yadav (1), Debajyoti Paul (1), François Chabaux (2), and Mathieu Granet (2)

(1) Department of Earth Sciences, Indian Institute of Technology Kanpur, India (rsinha@iitk.ac.in), (2) 2Laboratoire d'Hydrologie et de Géochimie de Strasbourg, Université de Strasbourg et CNRS, 1 rue Blessig, 67084 Strasbourg Cedex France

The Kosi megafan is a well-known Himalayan megafan formed due to high sediment delivery of Kosi River and frequent migration of the trunk river. The topography of conical Kosi megafan is convex-upward and the numerous paleochannels on its surface are the remnants of westward movements of the Kosi during last 200 years. The sub-surface stratigraphy of Kosi megafan has been reconstructed after detailed facies analysis of the drill core sediments. Near-surface ($\sim$20 m) strata have pockets of mud and silt within large amalgamated sand bodies whereas shallow sub-surface ($\sim$50 m) deposits are sandy and devoid of mud and silt pockets. Luminescence dating of core sediments suggests that the Kosi megafan has been evolving at least since MIS 4. Depositional phases characterized by aggradation and lithological discontinuity preserved in sedimentary succession has signatures of multiple aggradational events and autocyclic movements of channels. Variable net deposition rates (0.3 – 2.4 mm/yr) since MIS 3, calculated in different cores, relate to channel residence times as well as major climatic shifts. Stratigraphic reconstruction suggests that the Kosi River has been a multi-channel system for the last 65 ka due to high sediment flux from the Himalaya. We have recorded five cycles of channel activity: (i) $>$ 65ka (MIS4), (ii) 32 to 50ka (MIS3), (iii) 12 to 28ka (MIS2), (iv) 9 to 11ka (Early Holocene), and (v) 5ka to Modern (Late Holocene) in the studied cores. Multiple aggradational events and abandonment due to migration of the river show some correlation with the major climatic shifts, which in turn influenced the sediment flux from the Higher/Lesser Himalaya. Proximal to distal progradation of the megafan in response to climate and energy conditions reflects gradual decrease in flow energy through time or change in sediment supply from the hinterland. After confirming that the radiogenic isotopic ratios (^{87}Sr/^{86}Sr and ^{143}Nd/^{144}Nd) in Kosi core sediments are not affected by sediment leaching/sorting, these are used for provenance determination. Isotopic composition (^{87}Sr/^{86}Sr: 0.7785 to 0.8592; ε_{Nd}: -21.2 to -17.8) of Kosi core sediments are the most radiogenic reported so far in the Gangetic basin, and also suggest binary mixing of sediments contributed from both Higher Himalayan (HH) and Lesser Himalayan (LH) sources. Down core isotopic variability shows variation in sediment provenance due to major climatic shifts - high ^{87}Sr/^{86}Sr and low ε_{Nd}characterize the interglacial period whereas low ^{87}Sr/^{86}Sr and high ε_{Nd}dominate the glacial period. This is attributed to the litho-tectonic setting of the Kosi basin wherein deformed sequence of Himalayan zone exposes the HH rocks at a lower topographic level. In summary, stratigraphic reconstruction of one of the largest megafans in the world is unraveled and the controls of provenance and climate change during the Late Quaternary period are inferred from geochemical composition of the sediment cores.