Geophysical Research Abstracts
Vol. 17, EGU2015-6661, 2015
EGU General Assembly 2015

Large–scale avulsion of the late Quaternary Sutlej river in the NW Indo–Gangetic foreland basin

Ajit Singh (1,2), Sanjeev Gupta (2), Rajiv Sinha (1), Andrew Carter (3), Kristina J Thomsen (4), Darren F Mark (5), Jan-Pieter Buylaert (4,6), Philippa J Mason (2), Andrew S Murray (6), Mayank Jain (4), and Debajyoti Paul (1)

(1) Department of Earth Sciences, Indian Institute of Technology Kanpur, India, (2) Department of Earth Science and Engineering, Imperial College London, United Kingdom (ajit.singh@imperial.ac.uk), (3) Department of Earth and Planetary Sciences, Birkbeck and University College of London, UK, (4) Centre for Nuclear Technologies, Technical University of Denmark, DTU Risø Campus, Roskilde, Denmark, (5) Natural Environment Research Council Argon Isotope Facility, Scottish Universities Environmental Research Centre, Glasgow, UK, (6) Nordic Laboratory for Luminescence Dating, Department of Geoscience, Aarhus University, DTU Risø Campus, Roskilde, Denmark

River avulsions are important processes in the spatial evolution of river systems in tectonically active sedimentary basins as they govern large–scale patterns of sediment routing. However, the pattern and timing of avulsions in large river systems are poorly documented and not well understood. Here we document late Quaternary paleo–river channel changes in the Indo–Gangetic basin of northwest India. Using a combination of satellite remote sensing and detailed sediment coring, we analyse the large–scale planform geometry, and detailed sedimentary and stratigraphic nature of a major fluvial sedimentary deposit in the shallow subsurface. This sediment body records aggradation of multiple fluvial channel fills. Satellite remote sensing analysis indicates the trace of the buried channel complex and demonstrates that it exists in region of the Himalayan foreland where no major rivers are currently present. Thus it records the former drainage pathway of a major river, which has since been diverted. We use optically stimulated luminescence dating techniques to develop an age model for the stratigraphic succession and hence constrain the timing of river channel existence and diversion. Provenance analysis based on U–Pb dating of detrital zircons and detrital mica Ar–Ar ages indicate sediment sources in the Higher Himalayan Crystalline and Lesser Himalayan Crystalline Series indicating that this paleo–river channel system formed a major perennial river derived from the main body of the Himalaya. Specifically we are able to fingerprint bedrock sources in the catchment of the present–day Sutlej river indicating that the paleo–fluvial system represents the former course of the Sutlej river prior to a major nodal avulsion to its present day course. Our results indicate that on geologically relatively short time–scales, we observe dramatic along strike shifts in the location of major Himalayan rivers. Our sediment records when combined with high–resolution dating and isotopically–defined provenance fingerprinting enable us to reconstruct the source of an ancient paleo–river in the Indo–Gangetic plains and its temporal evolution.