Geophysical Research Abstracts,
Vol. 11, EGU2009-14067, 2009
EGU General Assembly 2009

Constraining provenance and the timing of large-scale Tertiary river capture in the eastern Himalayas: detrital minerals and dating of the Irrawaddy catchments of Myanmar

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The eastern syntaxis region of the Himalaya is a complex geological collision zone where uplift, deformation and river capture have all influenced landscape evolution during the Cenozoic. The concept of focused precipitation driving erosion and uplift was developed in the eastern syntaxis (Zeitler et al. 2001) where the Irrawaddy, Tsangpo and Brahmaputra rivers drainage patterns suggest major river capture has affected their present orientation. It has been suggested in previous studies (e.g., Brookfield, 1998) that the Tsangpo in Tibet formerly drained into the proto-Irrawaddy system prior to its capture by the Brahmaputra, although the timing of the capture event is unknown. The timing should be recorded in the age and composition of detrital minerals deposited in the Cenozoic fluvial deposits of the Central Myanmar Basin.

We are investigating the timing of this river capture event using geochemistry and U/Pb dating of detrital minerals separated from Eocene, Oligocene, Miocene, Pliocene, Quaternary and modern sediments of the Irrawaddy River catchments to fingerprint the possible provenance of the Tertiary and recent sediments. The detrital mineral geochemistry and dating is also being compared with the modern Tsangpo and Brahmaputra river sediments in order to help discriminate potential provenance signatures of the palaeo-Tsangpo system. A combination of U/Pb dating (using LA-ICPMS) of detrital zircons and garnet geochemistry (using EPMA) allows both the age of source areas and an interpretation of their tectonic setting to be determined, and hence potential provenance areas to be identified. The distribution of U/Pb ages for each sample is distinctive and demonstrates that early Himalayan detritus (∼55Myr zircons) is contained in the earliest Eocene sediments. Our dating constrains the river capture event that beheaded the Irrawaddy from the Tsangpo to Early Miocene time (17-18 Ma).

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