

2006 Philadelphia Annual Meeting (22–25 October 2006)

Paper No. 65-14

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EROSION AS A GEODYNAMIC AGENT IN THE HIMALAYAN SYNTAXES

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Both ends of the Himalaya terminate in prominent syntaxes that together make up a significant fraction of the orogen. Because of their location near plate corners, deformation within the syntaxes is active and variable in both space and time, as is erosion. Locally, very high erosion rates approaching 1 cm per year have been in play over the past several million years, and the combination of very high erosion rates and active tectonism set the stage for strong coupling between surface and tectonic processes. The long-term geodynamic evolution of the syntaxes has led to deep integrated incision by large orogen-crossing rivers that are capable of clearing all material served up to them by glacial and fluvial erosion and landsliding along steep slopes. This in turn enables efficient evacuation of mass sufficient to be geodynamically significant and to be capable of mediating surface/solid-Earth coupling.

Even though small in extent, signature features of both syntaxes are the very active metamorphic massifs embedded within them. In concert with structural and petrological constraints, geochronological and thermochronological data suggest that these massifs have been experiencing rapid rock uplift for several million years. In the eastern Himalaya, erosion within the Namche Barwa massif contributes on order 50% of the detritus to the Tsangpo-Siang system even though the massif is only a small fraction of the river's watershed. Cooling-age evidence from Namche Barwa in the east and Nanga Parbat in the west suggests that these massifs and associated knickzones along the Tsangpo and Indus have been relatively stable in location over the past few million years. However, given the complexity of the deformation field near the plate corners and the strong gradients in topography, the nature of any geomorphic steady state remains difficult to assess, and in general landscape evolution and rates of erosion have been sufficiently variable in time and space to rule out any simple generalizations.

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Session No. 65

[Erosion: Processes, Rates, and New Measuring Techniques](#)

Pennsylvania Convention Center: Auditorium Lecture Hall

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