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Defining Spatial Gradients in Fluvial Erosion Across the Eastern Himalayan Syntaxis

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AB The Eastern Himalayan Syntaxis is a region with high relief, the most powerful river in the Himalaya (Finlayson et al., 2002) and exceptionally rapid exhumation over the last 3 million years (Burg et al.,1997). Due to the spatial coincidence of the 5000 m deep Tsang-Po River gorge and the young, rapidly exhumed Namche Barwa metamorphic massif within the Eastern Himalayan Syntaxis, it has been suggested that river erosion is localizing crustal advection in the region (Zeitler et al., 2001). To help define the surface boundary conditions that would enable development of such a self-organized balance between erosion and rock uplift, we calculate an index of fluvial erosion rate for major rivers (Parlung, Jiong and Tsang-Po) in the Eastern Himalayan Syntaxis. We compute the annual mean unit stream power drawing on high resolution data from a number of sources. We use elevation profiles derived from DMA DTED 90 m and ASTER 30 m digital elevation models to generate river slope measurements. We use maps of river width generated from Landsat TM scenes to define continuous river width changes. Apart from

being essential for stream power calculations, these data also highlight the importance of river width as a first-order control on a river's ability to erode bedrock. Finally, we use TRMM satellite rainfall measurements verified with Chinese Hydrological Bureau statistics (Anders et al., this meeting) to define spatial variation in river discharge. The stream power calculations predict a heterogeneous pattern of erosion along major river channels which is consistent both with the pattern of rock uplift implied by the geologic structure of the region and with exhumation patterns revealed by thermochronologic work, suggesting a topographic steady-state condition. To evaluate this prediction and clarify the relationship of unit stream power to fluvial incision rate and landscape lowering rate, we are measuring in-situ cosmogenic 10Be from fluvially polished bedrock surfaces and in sediments from small, non-glaciated catchments along the Parlung River.

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