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HR: 1340h
AN: **T23B-0482**
TI: Active uplift and erosion of the Namche Barwa-Gyala Peri massif
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AB: The eastern syntaxis of the Himalaya entrains a steep reach of the largest Himalayan river, the Tsangpo- Brahmaputra, as it slices a gorge through the rapidly cooled and deeply incised Namche Barwa-Gyala Peri massif. This spatial association has lead to suggestions of a coupling between erosion and crustal deformation in this region. However, until now neither the geomorphology nor the thermal history of the eastern syntaxis has been characterized with enough detail to confirm such coupling, and hence to address the unique geodynamics of this region. Using measured channel width, TRMM satellite-derived river discharges,

and channel slopes determined from 90 meter-resolution digital elevation data, we compute spatial patterns in river power as an index of the rate of fluvial incision across the eastern syntaxis. Comparisons between patterns in river power, zircon (U-Th)/He ages, and biotite Ar-Ar ages reveal a tight spatial correspondence between river power and cooling ages, which suggests a sustained balance between rates of vertical rock ascent and erosion at the surface over the last ~ 1 - 2 My. Aerial mapping of alluvial fans, glacial deposits, landslide deposits, active braided plains, and incised fill terraces indicates that long term valley-bottom sediment storage within the syntaxis is primarily restricted to regions with wide channels, low river power and slow rates of mineral cooling. This provides evidence that sediment supply relative to transport capacity and the frequency of channel alluviation are likely to strongly influence rates of river incision over geologic timescales. However, we identify two locations on the margins of the Namche Barwa-Gyala Peri uplift where reaches of low unit stream power are associated with rapid cooling. On the upper Yarlung Tsangpo, a downstream step in the location of active thrusting or an acceleration of domal uplift along the western margin of the Namche Barwa-Gyala Peri massif may have lead to damming, ponding, and alluviation of a reach of the river with young zircon and biotite ages. On the lower Parlung Tsangpo, Quaternary glaciation and recent landslide activity have inundated the river with coarse sediment. Because channels where bedrock is shielded by alluvial sediment are wider than those cut in bedrock, calculated fluvial power along the lower Parlung is approximately 50% of what it would be for a bedrock channel of equivalent slope. This helps explain the mismatch between current fluvial power and longer-term exhumation rates in these locations, and underscores the importance of channel width in the bedrock incision problem. Finally, we show that clearly defined topographic lineaments correspond with steep gradients in fluvial power, providing independent evidence for the location of surface-breaking faults.

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