2005 Fall Meeting
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AN: **U32A-04**

TI: Cosmogenic Nuclide Determination of the Source of Sediment to the Brahmaputra River

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AB: The Ganges-Brahmaputra river system ranks first among the world's rivers in total sediment flux. One of the two principal tributaries to this system, the Yarlung Tsangpo/Brahmaputra River (YTBR) is the main source of sediment and water to the northeastern Himalayan foreland. Upstream, where the river traverses the eastern Himalayan syntaxis, it slices a 5 km-deep gorge through rapidly cooled crystalline rocks, some exhumed over 20 km since the end Pliocene. The spatial coincidence of the Tsangpo gorge with the highly deformed and rapidly exhumed rocks of the Namche Barwa-Gyala Peri massif has motivated the hypothesis that vigorous erosion by the YTBR helps localize crustal uplift and deformation in this region of the Himalaya. To better understand the geomorphic and geodynamic evolution of this spectacular region, we measured in-situ, cosmic-ray produced Be-10 in quartz sand from rivers entering and exiting the eastern syntaxis. From where the YTBR plunges off the Tibetan Plateau in Gyala, Tibet, to where it emerges from its gorge at the Himalayan front in Pasighat, India, in-situ Be-10 concentrations in quartz sand diminish 12-fold from 390293 +/- 19954 atoms/g to 31305 +/- 805 atoms/g due to dilution of plateau sediments by locally-derived low-Be-10 quartz. Based on these constraints and on measurements of Be-10 in quartz sand from tributaries to the YTBR, we calculate that 93-98% of the sediment carried by the river in Pasighat is sourced from the 20% of the watershed within the syntaxis. Monte Carlo simulations indicate that sediment eroded within the upper gorge has a concentration of 10,393 +/- 5977 (1 Std. Dev.) atoms/g, corresponding to an erosion rate of 7.7 +/- 4.4 mm/yr. This rate stands out particularly when compared to erosion rates measured on the plateau (0.15 - 0.30 mm/yr) and inferred for the lower gorge (0.9 +/- 0.5 mm/yr). We conclude that the rapid cooling and decompression of the core of the syntaxis over the last 5 Ma, together with our data demonstrating the overwhelming sedimentary input of the syntaxial region to the Ganges-Brahmaputra system, argues strongly for sustained and focused erosion of this region since the late Miocene.

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DE: 1218 Mass balance (0762, 1223, 1631, 1836, 1843, 3010, 3322, 4532)
DE: 1625 Geomorphology and weathering (0790, 1824, 1825, 1826, 1886)
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