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TI: Fission-track Evidence for the Source of Brahmaputra River Sands Within the Eastern Himalayan Syntaxis: a Large Flux from a Tiny Source

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AB: We present new zircon and apatite fission-track results from river sands of the Brahmaputra system; they complement our prior results and add to diverse lines of evidence indicating that erosion in the core of the eastern Himalayan syntaxis has been and is exceptionally rapid. These new results improve definition of the bedrock source area for very young grains: a source of uncertainty in our original data set stemmed from our key downstream sampling site being at Pashigat, on the floodplain of the Brahmaputra, permitting drainages other than the Tsangpo/Siang (local names for the upper Brahmaputra) from being potential contributors of young grains. One important new sample was collected near Medoc, in the lower reaches of the Tsangpo gorge, allowing us to tightly bracket detrital contributions from this deep gorge through the geologically active Nanche Barwa-Gyala Peri massif, the likely source of very young cooling ages of less than 2 Ma. The second sample was collected from a small river draining the cirque glacier incising the NW side of Namche Barwa. We report analyses of 37 zircon grains and 66 apatite grains from the Medoc sample and 80 zircon grains from the cirque sample. Our new results are as follows (previous results from Pashigat are shown in parentheses). The youngest peak identified by BINOMFIT in detrital zircons from Medoc is 0.6 Ma (0.6 Ma), and significantly, it includes 51% (47%) of the entire sand-sized population. The youngest grains are ~ 0.1 Ma (0.1 Ma), and a significant subset has a peak age of 0.3 to 0.4 Ma (0.4 Ma). The

youngest peak in apatite fission-track ages from the same samples is 0.5 Ma (0.4 Ma) and includes 58% (39%) of the grains. Zircons from the Namche Barwa cirque also yield a population of extremely young ages having a number of peaks, the youngest of which is 0.3 Ma and accounts for 35% of the grains; the oldest grain in this entire sample is 3.3 Ma. The age distributions from Medoc and Pasighat are very similar, giving us confidence that the young, rapidly exhumed sand grains seen in the Brahmaputra do originate from the Namche Barwa-Gyala Peri massif. Further, the youngest zircon and apatite subsets from Medoc are statistically indistinguishable (0.4 and 0.5 Ma), suggesting exceptionally rapid cooling in the source region, consistent with minimum bedrock cooling ages from Namche Barwa and the Tsangpo gorge: zircon fission-track dates (0.2 Ma), biotite Ar-Ar ages (1.0 Ma), and zircon helium ages (0.3 Ma) (also, zircon U-Pb ages in anatectic units quench at 1 Ma). Our results suggest that erosion rates within a geographically limited area of some 5000 km^2 are sufficiently high to produce a sediment flux than equal if not overwhelm the sediment generated in the Himalaya to the south. Note: sadly, Richard Stewart passed away after carrying out this work and we dedicate this presentation to him.

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