Detrital zircon study along the Tsangpo River, SE Tibet

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The interactions among tectonic uplift, river erosion and alluvial deposition are fundamental processes that shape the landscape of the Himalayan-Tibetan orogen since its creation from early Cenozoic time. To better understand these processes around the eastern Himalayan Syntaxis, we conducted a study by systematic sampling riverbank sediments along the Tsangpo River, SE Tibet. Detrital zircons separated from the sediments were subjected to U-Pb dating by the SHRIMP II at the Beijing SHRIMP Center and then *in-situ* measurements of Hf isotope ratios using LA-MC-ICPMS at GEMOC. These results, together with U-Pb ages and Hf isotope data that we recently obtained for the Transhimalayan plutonic and surrounding basement rocks, allow a more quantitative examination of the provenance or "protosource" areas for the river sediments. Consequently, the percentage inputs from these source areas can be estimated. Our study indicates that, before the Tsangpo River flows into the Namche Barwa Syntaxis of the eastern Himalayas where the River forms a 180º Big Bend gorge and crosscuts the Himalayan sequences, the Gangdese batholith that crops out just north of the River appear to be an overwhelming source accounting for ~50% of the bank sediments. The Tethyan Himalayan sequences south of the River are the second important source, with an input of ~25%. The proportion of sediment supply changes after the River enters the Big Bend gorge and turns to south: ~25% of detrital zircons are derived from the Greater Himalayas so that the input from the Tethyan Himalayas decreases (<10%) despite those from the Gangdese batholith remains high (~40%). Comparing with the sediment budget of the Brahmaputra River in the downstream based on literature Sr, Nd and Os isotope information, which suggests dominant (~90-60%) but subordinate (~10-40%) contributions by the (Greater and Lesser) Himalayan and Tibetan (including Tethyan Himalayan) rocks, respectively, the change is interpreted to be a result of focused erosion along the Tsangpo-Brahmaputra river system that behaves as one of the most active mountain rivers on Earth.