Himalayan erosion and climate

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In Himalaya, the monsoon precipitations exert a primary control on the erosion. From its intensity depends on the extension of the glacier cover, landslide activity, river incision and export of sediments towards the floodplain and oceanic basins. The monsoon also exerts a primary control on the chemical erosion as weathering rates are clearly dependent upon river discharge.

In the floodplain, sediment export also is tightly controlled by climate. The seasonality of the monsoon allows to reach high flooding conditions generating efficient river transport to the delta (Lupker et al. 2011). This efficient transport also acts as a limiting factor for weathering as it reduces residence time in the floodplain. The comparison between the Ganga with a large floodplain and the Brahmaputra with a narrow floodplain and comparatively lower residence time confirm that Himalayan weathering is limited by transport.

When looking at sedimentary record of erosion in the proximal Bengal fan, weathering as traced by K/Al or OH^-/Al however appears lower during the LGM in spite of reduced discharge i.e. slower transport (Lupker et al. 2013). Reduced weathering intensity is, however, consistent with lower precipitation and temperature in the basin.

Recent IODP Expedition 354 in the Bengal fan generated a comprehensive record of Himalayan erosion over the Neogene and Quaternary. Turbiditic sediments have clear Himalayan origin and close mineralogical and isotopic analogy with those of the modern Ganga-Brahmaputra river sediments. This long-term record also reveals that the chemical compositions of turbiditic sediments cored across the transect are relatively stable throughout the Neogene and also during Quaternary. Over the last 25 Ma it appears that weathering was weak, and lower than during modern conditions. This long-term record suggests that the Himalayan erosion has been controlled by rapid physical erosion, with transport processes efficient enough to prevent weathering of the sediment load.

Lupker (2011) JGR **116(F4)**, F04012.
Lupker (2013) EPSL **365**: 243–252.

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