

## **Erosion processes and sediment transfer to the Ocean: a perspective from the Himalayan basin**

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A consequence of the Himalayan orogenesis is the development of the Ganga-Brahmaputra drainage basin. At the global scale, this basin is relatively modest in term of ocean discharge or continental area representing 2.9 and 1% respectively. On the contrary, its sediment discharge is above 1 billion tons/yr, which is about 10% of the global sediment flux to the oceans. The Himalayan erosion system presents a highly contrasted erosion and transport system with (1) a very steep and relatively short mountainous part, (2) a long and very flat floodplain and deltaic zone, and (3) a major turbiditic reservoir in the Bay of Bengal. Active processes that trigger erosion and transport in these different environments are very different from glaciers in the high Himalaya to turbidity current in the oceanic basin. Central in this system is the monsoon climate, which generates a four-month long flooding season that is the key to trigger landsliding in the mountain, and to allow massive sediment transport in the river system.

The Himalayan erosion products are stored in different continental and oceanic sedimentary reservoirs that record erosion processes at different time and space scales. These archives allow to unravel the geological history of Himalayan erosion as well as for scaling the magnitude of bio-geochemical fluxes associated with this basin or understanding relations between erosion and climate. Geochemical tracers can be used in addition to traditional sedimentological observations to trace the sources of sediments, the weathering intensity, the vegetation environment, and even in some cases, extreme events frequency. Most interpretations are based on the observation of the modern system of erosion, although we still do not fully understand the response of erosion regime to climate changes such as glacial-interglacial cycles for instance. Chemical and isotopic compositions of detrital sediments are however controlled at the first order by mineralogical sorting occurring during transport. In order to take into account these effects of mineralogical/chemical differentiation, depth profile in the rivers from the Himalayan front down to the Bangladesh delta allow characterizing these effects. Mineral segregation tends to enrich surface suspended load in fine grained / clay rich particles whereas bed-sediments tend to concentrate in coarser and quartz rich particles. Sorting process exerts a first order control on chemical and isotopic compositions and is well correlated to simple granulometric parameters or to Al/Si ratio. Provenance of sediment and weathering processes from soils to floodplain exert more discrete chemical variations. It is therefore necessary to decipher both

effects in order to quantify one or the other.

Modern river sedimentological and geochemical characteristics will be compared to the different detrital records in the Siwaliks at the front of the range, in the floodplain and the delta and in the Bengal Fan.