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Bengal fan record of silicate weathering of Himalaya through Neogene.

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Continental weathering and erosion are major components of the Earth global geochemical cycles, transferring atmospheric CO_2 to sedimentary reservoir via the alteration of silicates and the transfer of organic carbon. In a kinetically limited weathering regime like the Himalaya, both monsoon and erosion exert critical control on the weathering intensity. The two Himalayan rivers namely the Ganga and the Brahmaputra export about a billion tons of sediments to the Bangladesh delta and Bengal fan. The turbiditic sediment of the Bengal fan preserves the history of the Himalayan erosion. Their chemical composition derives from source rock characteristics and the effect of weathering and mineral sorting during transport.

With the general goal to quantify the Himalayan paleo-erosion, our study focuses on silicate weathering flux using Neogene and Quaternary sediment record from IODP Expedition 354 at 8°N. The quantitative assessment is based on the difference in mobile element concentration of the sink relative to the source. Large differences in crustal maturity, hence of composition amongst the different Himalayan formations demand careful assessment of the sediment sources, done here using Sr-Nd isotopic composition. Chemical treatment has been adapted to retrieve major element composition devoid of carbonate, hence reflecting a silicate weathering signal.

Source rock composition is estimated from modern rivers. It is constrained using sediment and dissolved fluxes assuming a steady state physical and chemical erosion. Estimates on the loss of major cations for the Bengal fan sediments appear comparable with those of the modern system for Plio-Pleistocene period. In contrast Miocene sediments reflect higher depletion in Ca and Na, probably reflecting higher weathering intensity or change in Miocene source rock composition.

The presentation will review these results, providing estimates on the silicate weathering in Himalaya and the associated uncertainties