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Sr-Nd-Os evidence for a stable erosion regime in the Himalaya during the past 12 Myr

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Modern erosion of the Himalaya, the world's largest mountain range, transfers huge dissolved and particulate loads to the ocean. It plays an important role in the long-term global carbon cycle, mostly through enhanced organic carbon burial in the Bengal Fan. To understand the role of past Himalaya erosion, the influence of changing climate and tectonic on erosion must be determined. Here we use a 12 Myr sedimentary record from the distal Bengal Fan (DSDP Site 218) to reconstruct the Mio-Pliocene history of Himalayan erosion. We use carbon stable isotopes (13C) of bulk organic matter as paleo-environmental proxy and stratigraphic tool. Multi-isotopic – Sr, Nd, Os – data are used as proxies for the source of the sediments deposited in the Bengal Fan over time. 13C values of bulk organic mater shift dramatically towards less depleted values, revealing the widespread Late Miocene (ca. 7.4 Ma) expansion of C4 plants in the basin. Sr, Nd and Os isotopic compositions indicate a rather stable erosion pattern in the Himalaya range during the past 12 Myr. This supports the existence of a strong connection between the southern Tibetan plateau and the Bengal Fan. The tectonic evolution of the Himalaya range and Southern Tibet seems to have been unable to produce large re-organisation of the drainage system. Moreover, our data do not suggest a rapid change of the altitude of the southern Tibetan plateau during the past 12 Myr. Almost synchronous moderate changes in erosion pattern and climate changes during the late Miocene and at the Plio-Pleistocene transition support the notion of a dominant control of climate on Himalaya erosion during this time period. However, stable erosion regime during the Pleistocene is suggestive of a limited influence of the glacier development on Himalayan erosion.