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Monsoon Weakening and Lesser Himalayan Exhumation since the Late Miocene: Evidence from the Indus Submarine Fan

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Coring by International Ocean Discovery Program in the Arabian Sea provides a record of erosion across the western Himalaya dating back about 11 Ma. A multi-proxy analysis of the provenance now indicates a steady increase in erosion from Himalayan source relative to those located further further north in the Karakoram. Faster erosion of the Lesser Himalaya began around 6 Ma and accelerate substantially after 3 Ma. At the same time chemical weathering indices and clay mineralogy point to reduced alteration of sediment especially over the climatic transition of 7-8 Ma, consistent with a regional drying of the climate. Apatite fission track analysis indicates a period of extremely rapid erosion at the time of the climatic transition followed by a decrease in erosion rates that correlates with long-term weakening of summer rains and slower sediment accumulation in the Arabian Sea. This roofing of the Inner Lesser Himalaya is probably not linked to climatic change rather to surface uplift caused by the development of the Inner Lesser Himalayan imbricate thrust wedge. Summer rains falling against this rising topography would then focus erosion and further drive development of the imbricate stack. Widespread exposure of the Inner lesser Himalaya is somewhat younger than has been inferred from local studies within the foreland basin itself.