

## **A Middle-Late Miocene weathering record of the Himalayan foreland basin, Jammu, NW Himalaya**

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The Late Miocene was a period of declining CO<sub>2</sub> levels and extensive environmental changes, which likely had a large impact on monsoon strength as well as on the weathering and erosion intensity in the South Asian monsoon domain. To improve our understanding of these feedback systems, we have analyzed fine grain sediments (<63 μm) of Himalayan foreland basin from the Jammu Region, NW Himalaya. In the present study, we have used major elemental compositions, trace and rare earth elements concentrations and clay mineralogical assemblages of Upper and Middle Siwalik Formation to identify provenance and weathering regime related to South Asian monsoon rainfall from 12.8 to 5.6 Ma. The elemental ratios of La/Sc, Th/Sc, Th/Co, Eu/Eu\* suggest felsic source rock composition, which is further supported by chondrite-normalised REE pattern consisting enriched LREE and flat HREE, along with negative europium anomaly. The detrital sediments deposited in the Himalayan foreland basin possibly originated from the Higher Himalayan Crystalline and Lesser Himalayan regions. A combination of weathering indices such as Rb/Sr ratio, Chemical Index of Alteration (CIA), and Plagioclase Index of Alteration (PIA) along with clay mineral assemblages indicate that the source rock has undergone variable degree of chemical weathering and indicate sharp change from low to high weathering around 9.5 Ma. The smectite/(illite+chlorite) ratio and δ<sup>13</sup>C records from the region along this change suggest expansion of C4 plants as a consequence of decreased winter precipitation and more seasonality associated with less humidity which lead to a more arid climate.