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Geochemistry of sediments of the Indo-Gangetic Plains: Evidence of large scale sediment recycling

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The Indo-Gangetic Plains (IGP), a major physiographic unit of the Indian subcontinent formed in response to the Himalayan orogeny in the Quaternary , is a vast expanse of alluvial sediments. IGP have been supporting human civilization for the past several millennia and hold a wealth of information on the climate and tectonic history of the region. However, no serious geochemical study has so far been undertaken on this extensive alluvial province to extract geologically important information for a better understanding of the evolution of this plain. We studied sediments from Satluj-Ghaggar-Yamuna-Ganges-Ramganga plains and desert sediments (dunes, loessic sediments and present day dust) from the eastern margin of the Thar Desert.

Textural, mineralogical and geochemical data including REE abundance in these sediments indicate that all the sediments of IGP are geochemically consanguineous and require a common, average upper continental crustal source (UCC). The sources seem to have undergone very mild chemical weathering. However, the reported data of suspended load from the upper reaches of Indus and Brahmputra rivers show a lesser extent of negative Eu anomaly than the floodplain sediments, indicating either less reworking because of accelerated erosion or the presence of geochemically less evolved lithologies at the upper reaches of the rivers.

The uniformity of elemental geochemistry, particularly rare earth elements, of the sediments of IGP indicates several cycles of sedimentary reworking. This in turn points to a dominant Sub-Himalayan sedimentary source for the IGP, thereby, making the IGP a Quaternary extension of Tertiary Sub-Himalayas.

Keywords: Indo-Gangetic Plains; Quaternary sediments; geochemistry.