Influence of monsoon and provenance on Sr and Nd isotope systematics (IODP-353,U1445)

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A 672.6 m long sediment core (U1445) was collected during IODP-353 from Mahanadi basin, Bay of Bengal to reconstruct changes in Indian monsoon circulation. The core was collected at a water depth of 2502 m (Lat.:17°45´N, Long.:84°47´E). Onboard biostratigraphy and lithostratigraphic studies indicates sedimentation from late Miocene to Holocene time period [1]. Geochemical analysis of the lithogenic fraction including Sr and Nd isotope ratios, major, trace and REE concentrations of the sediments were carried out to understand the sediment provenance and weathering intensity variations in the Mahanadi basin. Sr isotope ratios vary from 0.73629 to 0.75891 and εNd varies from -13.4 to -17.8. Fe/Al ratio varies from 0.38 to 0.66, C1-chondrite-normalised (La/Yb) ratio varies from 11.1 to 17.7 and Rb/Sr varies from 1.5 to 3.6. The Sr-Nd isotope ratio profiles show significant vertical variations. These variations can be attributed to the changes in the sediment provenance. Although the catchment area of the Mahanadi basin consists of Archaean and early Proterozoic granite batholiths, tonalite-trondhjemite gneisses, charnockites, khondalites, various sedimentary rocks (limestone, shale and sandstone) of Gondwana age, the Sr-Nd isotope ratios show some signatures of Deccan basalts. Higher Fe/Al ratios than that of granites (Fe/Al: 0.2 to 0.48) [2] also show some sediment contribution by Deccan basalts (Fe/Al: 1.2 to 1.6) [3]. The sediment contribution from the Deccan basalts which is not present in the Mahanadi catchment area may be attributed to the sediment transportation from the Krishna-Godavari basin by long-shore current. The Rb/Sr ratio show variations with depth and correlates closely with the Sr isotope ratios. This correlation shows the influence of weathering intensity variations possibly caused by monsoon intensity variations in the sediment provenance.

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