

Yttrium and Rare Earth Element partitioning in seawaters from the Bay of Bengal

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Abstract

The dissolved Yttrium (Y) and Rare Earth Element (REE) concentrations of seawater samples collected along a north-south hydrological transect within the Bay of Bengal (BoB) have been analyzed to estimate contributions of the Ganges and Brahmaputra (G-B) river inputs to the dissolved REE distribution of the Northern Indian Ocean. Surface water masses of the BoB are characterized by Y/Ho ratios (84) intermediate between the G-B river suspended sediment (41) and water mass from the South Indian Ocean (93). Co-variation of MREE (Middle REE, Sm) and LREE (Light REE, La) concentrations suggests that the dissolved REEs in surface waters (upper 100 m depth) of the BoB ($Sm/La = 0.21$) appear to derive mainly from the freshwater discharge of the G-B river system. In contrast, values obtained in the intermediate and deep-waters ($Sm/La = 0.14$) suggest a mixing of dissolved REEs deriving from the release of G-B river suspended particles ($Sm/La = 0.16$) and the contribution of Antarctic Bottom Water (AABW) ($Sm/La = 0.12$). Consequently, we propose that

MREE/MREE* ratios in the BoB waters could be an accurate proxy to trace lithogenic inputs from the G-B river system. The dissolved and particle re-mineralization Nd fluxes from G-B river system are calculated to constitute about 9% and 4% of the global dissolved river discharge and 'Boundary inputs' flux. Our estimation indicates that the massive G-B river system inputs could greatly alter the dissolved REEs distribution in the BoB and contribute to the dissolved REEs budget in the ocean.

Keywords: Bay of Bengal, seawater, Rare Earth Element concentrations, Ganges-Brahmaputra river system, residence times.