

Biogeochemistry of dissolved and particulate trace elements in a tropical estuary, Southwestern India

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The biogeochemical studies in the tropical estuaries are limited to heavy metals. This paper focuses on the concentration variability and biogeochemical behaviour of trace elements and rare earth elements (REE) in a tropical estuary along the salinity gradient during higher and lower river discharge period. The composite estuary of Swarna-Madisa-Seetha Rivers, west flowing rivers of Southern India is studied to understand the biogeochemical processes affecting the dissolved and particulate fraction of trace elements with varying physico-chemical characteristics and in the presence of dissolved organic carbon. The dissolved trace elements like Cr, Rb, Sr, Mo, As, Cs, Pb and U increase with salinity whereas Fe and Mn decrease with increasing salinity. Dissolved Al, Ge, Ba and Ga show higher concentrations at mid salinity and lower concentrations at freshwater and seawater end members. Dissolved REEs show identical behaviour with changing salinity for the three sampling seasons. Sr behaves conservatively in Swarna estuary with its average isotopic composition ($^{87}\text{Sr}/^{86}\text{Sr}$) of 0.7095 in dissolved fraction and 0.7286 in particulate fraction. The $^{87}\text{Sr}/^{86}\text{Sr}$ in dissolved fraction shows silicate dominance signatures with isotopic composition of 0.7108 at freshwater end member whereas the marine end member isotopic composition decreases to 0.7091. The dominant silicate lithology of the basin is reflected in the particulate fraction with $^{87}\text{Sr}/^{86}\text{Sr}$ varying from 0.7406 at freshwater end member to 0.7147 at marine end member.