Trace element biogeochemistry in the northern Indian Ocean

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Northern Indian Ocean acts as a natural laboratory to study the biogeochemstry of trace elements as it has all the ingradients to influence their distribution. It recieves large amount of fresh water and sediments from the Ganga, Brahmaputra, Indus, Irrawady and Salween rivers and aeolian dust from surrounding arid landmasses which supply various trace elements to the water column. Presence of oxygen minimum zone (OMZ) in intermediate water columns of the two adjoing basins of the northern Indian Ocean, the Arabian Sea and the Bay of Bengal (BoB) influences the internal cycling of many of the trace elemetns. Reducing condition prevailing near the sediment-water interface in these basins acts as sink/source for redox sensitive elements. As a part of international GEOTRACES programme systematic clean sampling has been carried out in the Indian Ocean to study the biogeochemistry of trace elements.

A suite of trace elemental and isotope measurements has been carried out in the water columns of northern Indian Ocean. Concentrations of dissolved U, Re and Mo (redox sensitive elements) display abslolutely conservative behaviour in the water columns even in the OMZ with very low oxygen. Mo isotope composition is conservative in the northern Indian Ocean including the OMZ of the Arabian Sea except in the northern shelf region of the Bay of Bengal where δ^{98}Mo of seawater is significantly lighter compared to that of the Open Ocean. This indicates release of lihgter Mo from Fe-Mn oxy-hydroxide coated on the sediments brought by the Ganga-Brahmaputra in the OMZ of BoB.

Dissolved iron (DFe) has been measured in 24 full water columns of the Indian Ocean including the OMZ of both Arabian Sea and Bay of Bengal using flow injection system. DFe displays surface minima and sub-surface maxima in OMZ.. Both OMZs have elevated DFe indicating its remineralisation from sinking particles in oxygen defficient condition. DFe is also being released from the shelf region of BoB. This study demonstrate large scale recycling of trace elments and isotopes in the Indian Ocean.