India

During last two years, GEOTRACES (India) were in process of acquiring clean sampling system. Finally the clean sampling system has been acquired as per the following details:
(i) Carousel Water Sampler with 24 Niskin X Teflon coated bottles(12 l) and CTD unit from Seabird
(ii) 14 mm Kevlar Cable from Cortland – 8000 m
(iii) Metal free CTD winch from Lebus International
(iv) Potable Clean Van from Silhouette, Canada

Cruises

Cruise of Section GI03 in Indian Ocean were undertaken during March 3 to May 10, 2013 onboard Sagar Kanya. This was first GEOTRACES – India cruise equiped with complete clean sampling system. All the key parameters are being measured in this section. Cruise track is shown in Figure 1. The initial planned track was modified after commencement of the cruise due to problems with dynamic positioning system of the vessel which was later rectified during the cruise.

Figure 1. Cruise track of section GI03 in the Indian Ocean.

Altogether 28 participants from 9 Indian institutions participated in this cruise. The entire cruise was devided in two legs, Leg 1: Goa, India to Jakarta, Indonesia and Leg 2: Jakarta, Indonesia to Chennai India. Water samples for measurements of key trace elements along with high volume samples for Hf, Nd, Ra, Th isotopes were collected on this cruise. Aerosol samples were collected all along this track. Water leachable ions from these aerosols were continuously monitored onboard.

Science

Internal cycling of dissolved barium in water column of the Bay of Bengal

Dissolved barium concentrations in water column of the Bay of Bengal along the 87°E transect (~6°N to ~21°N) have been measured to track the dispersion of its large influx from the Ganga–Brahmaputra river system and the outflow to the equatorial Indian Ocean. A

typical barium concentration–depth profile shows relatively higher Ba concentration in surface waters (depth <5 m) followed by a minimum in the depth interval ~50–150 m, which further increase with depth. The barium concentrations in surface waters (depth ≤ 5 m) of the Bay of Bengal vary from ~34.9 nmol/kg in the southern BoBt to ~112.8 nmol/kg close to mouth of the Hooghly. The dissolved Ba in the surface water of BoB is dominated by its supplyfrom the G–B river system. The Ba concentrations in deep waters (depth ≥500 m) is controlled dominantly by water mixing as suggested by a very strong and significant inverse correlation with salinity. Exceptions to this conservative behavior are the "hot-spots" of dissolved Ba in bottom waters, which are probably resulted by the dissolution of sediments at and/or below the sediment–water interface. Under the steady state the annual Ba influx from the Ganga–Brahmaputra river system seems to be balanced through its removal via sinking particulates as a result there is no lateral outflow of dissolved Ba from the G–B to the equatorial Indian Ocean through top ~100 m of the BoB. Most of this sinking particulate Ba (~95 %) is regenerated again in the lower box, preferentially in the intermediate waters ~100–500 m. Therefore, frequently ventilated intermediate waters of the Bay of Bengal, receiving a large input of dissolved Ba through particle remineralization can be the significant source of dissolved Ba to the Indian Ocean.

Molybdenum isotope composition in Narmada and Tapi estuaries

Behaviour of Mo isotope composition in dissolved phase has been studied in the Narmada and Tapi rivers and estuaries. Mo isotope composition in these water were measured ousing double spike by MC-ICP-MS. d^{98}Mo of dissolved Mo of these rivers display higher values compared to that of the basalt, the major lithology of these rivers indicating adsorption of lighter Mo on Fe, Mn oxy hydroxide during riverine transport. Mo isotope display non-conservative behaviour in both the Narmada and the Tapi estuary. In the Narmada estuary, lighter Mo being contributed either by particle desorption or from submarine groundwater discharge. In the Tapi estuary, lighter Mo is being supplied by anthropogenic activities such as from steel industry situated nearby. This study underscores the need to characterize the Mo isotope composition of global rivers and estuaries before using it as a proxy of paleo-redox condition.

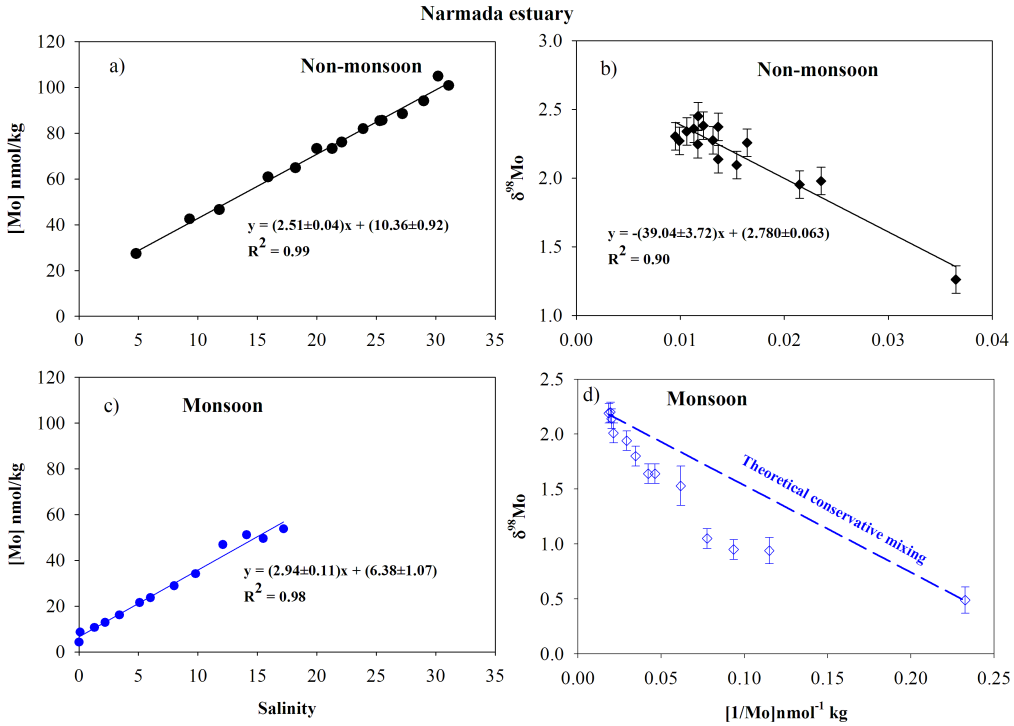

Figure 2. Mo isotope displays non-conservative behaviour in the Narmada Estuary indicating supply of lighter Mo either from particulates or from submarine groundwater discharge

Meeting Arranged

- GEOTRACES SSC meeting during October 29-31, 2013 at Goa, India.
- Data Management Committee meeting during October 27-28, 2013 at Goa, India.

Planned Cruise

- Arabian Sea: Cochin – Goa, January, 2014: along 68° E from 1° N to 21° N.

Publication

- Singh S.P., Singh S. K. and Bhushan R. (2013) Internal cycling of dissolved barium in water column of the Bay of Bengal, Marine Chemistry 154, 12–23.

Submitted by: Sunil Kumar Singh