

## **Dissolved aluminium cycling in the northern, equatorial and subtropical gyre region of the Indian Ocean**

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Dissolved aluminium (hereafter, dAl) concentrations have been determined on 34 full vertical water column profiles, sampled along the two GEOTRACES transects (GI-01 and GI-10) in the northern (Bay of Bengal, Andaman Sea and Arabian Sea), equatorial and subtropical gyre region of the Indian Ocean to understand its biogeochemical controls. The impact of huge supply of suspended lithogenic sediments, from the Ganga-Brahmaputra river system, Indian peninsular rivers and resuspended terrigenous sediments from the continental shelf and slope, on dAl distribution is seen as an overall increase in the dAl concentrations throughout the water column towards the northern Bay of Bengal (BoB). The fractional solubility of Al from the lithogenic sediments input in the BoB surface waters is estimated to be in the range of 1.1–4.7 %. Rapid renewal of and vertical mixing in the deeper waters (>1000 m) relative to, apparently, slow scavenging removal of dAl results in near uniform dAl concentrations (~ 3.7 nM) in the deeper waters of the central southern Andaman Sea. dAl distribution in the surface waters of southeast Arabian Sea is dictated by continental outflow of mineral dust and its subsequent deposition in the region. dAl in equatorial surface waters is predominantly determined by the mixing between dAl-rich surface waters of southern Bay of Bengal and relatively, dAl-depleted surface waters of southern Arabian Sea under the influence of northeast monsoon current. Using the 1-D scavenging–advection–diffusion model, the scavenging residence time of dAl in the equatorial deep waters is estimated to be in the range of 92–141 years. Deposition of Australian dust and advection of Indonesian Throughflow waters translates to the dAl enrichment in the upper water column (<500 m) at the northern end of the Indian Subtropical Gyre. Sediment resuspension from Central Indian Ridge and ventilation of dAl-rich bottom water (>3500 m) across the Ninety East Ridge from Western Australian Basin is observed to control the dAl distribution in the deeper (>2000 m) waters of the Central Indian Ocean Basin.