

Dissolved zinc and its speciation in the northeastern Indian Ocean and Andaman Sea

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Introduction

Zinc (Zn) is an essential micronutrient for bacteria and phytoplankton in the ocean. Reportedly, organic complexes of dissolved zinc in surface waters reduce the bioavailable fraction of zinc, the free metal ion (Zn^{2+}), to a level as low as 1 pmol/L [1]. Therefore, Zn speciation is important to understand biogeochemical cycles of Zn in the ocean. In this study, distributions of dissolved Zn and its speciation were determined to investigate the biogeochemical processes of Zn in the northeastern Indian Ocean and Andaman Sea.

Methods

Seawater samples were collected in the northeastern Indian Ocean and Andaman Sea by using acid-cleaned X-type Niskin samplers installed on the CTD-CM [2] during the R/V Hakuho-maru research cruise (in July and August 2013). Total dissolved Zn (C_{Zn}) was determined cathodic stripping voltammetry after UV-digestion. Ligand concentrations (C_L) and conditional stability constants (K'_{ZnL}) were obtained from a titration using competitive ligand equilibrium / adsorptive cathodic stripping voltammetry [3].

Results and Discussion

In the Andaman Sea, salinity data indicated the influence of fluvial discharge from Irrawaddy and Salween rivers was observed in the surface layer (5 – 75 m depth). In the surface waters of the northern Andaman Sea, with high Chl *a* contents, total dissolved Zn concentrations were relatively lower than those of southern Andaman Sea, which might reflect the biological uptake of dissolved Zn in the northern Andaman Sea. Furthermore, total ligand concentrations only in the northernmost station of the Andaman Sea are well correlated with Chl *a* contents, but not in other stations. In the high-productivity area of the marginal sea, phytoplankton and bacteria-excreted organic substances might be one of the dominant sources for Zn complexing ligands.

[1] Bruland et al. (1991) *Limnology and Oceanography* **36**(8), 1555-1577. [2] Kim et al. (2015) *Limnology and Oceanography: Methods* **13**, 30-39. [3] Van den Berg (1985) *Marine Chemistry* **16**, 121-130.