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Distribution of dissolved and particulate trace metals (Al, Mn, Fe, Co, Ni, Cu, Zn, Cd, Pb) in the Indian Ocean: Distinct characteristics relative to the Pacific Ocean

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We report total dissolvable (tdAl, tdMn, tdFe, tdCo, tdNi, tdCu, tdZn, tdCd, tdPb) and particulate (pAl, pMn, pFe, pCo) concentrations in seawater samples collected along the GEOTRACES GI04 transect during the R/V Hakuho Maru KH-09-5 cruise from November 2009 to January 2010, during the northeast monsoon season. These elements serve as oceanographic tracers and micronutrients, but their global distribution is still poorly understood, particularly in the Indian Ocean (IO). The IO is surrounded by Asia, Africa, and Australia, and due to its smaller area compared to the Atlantic and Pacific Oceans, receives a larger supply of terrigenous material per unit area and it is therefore strongly influenced by continental weathering.

The pMs were calculated as the difference between tdMs and reported dMs[1]. The Pacific Ocean (PO) data from our previous studies were used for comparison. dAl concentrations in IO were higher (5.7 ± 2.2, n = 189) than those in the North Pacific (NP; 3.2 ± 1.1, n = 537), whereas pAl remained at similar levels. At depths greater than 100 m in the northwestern IO (≥ 0°N), dFe concentrations (4.1 ± 0.6, n = 54)were higher than those in both NP (2.3 ± 0.4, n = 490) and the South Pacific (SP; 0.8 ± 0.3, n = 327). A strong correlation between pFe and pAl was observed across all samples. Notably, the slope in IO (0.399) was lower than those in NP (0.543) and SP (0.636). These results suggest that IO receives a greater contribution of iron-poor, old granitic continental sources [2]. Compared with PO dZn concentrations at mid-depths in the northwestern IO fell significantly below the regression line on the dZn vs. $Si(OH)_4$ plot, where pFe and pAl were extremely high, suggesting scavenging of dZn by terrigenous particles.

[1] Vu, H. T. D. & Sohrin, Y. (2013), *Sci. Rep.* **3**, 1745.

[2] Ueki, R., Zheng, L., Takano, S. & Sohrin, Y. (2024), *Mar. Chem.* **260**, 104365.