Dissolved indium in the North Atlantic and the Mediterranean

D. S. Alibo
Y. Nozaki
C. Jeandel

The Ocean Rsearch Institute, University of Tokyo, Nakano-ku, Tokyo 164-8639, Japan and UMR 39 (CNES/CNRS) Observatoire Midi-Pyrenees, 14, Ave Edouard Belin-31400-Toulouse, France

Vertical profiles of dissolved indium were determined in the eastern North Atlantic, and the Mediterranean to compare with that of the western North Pacific reported earlier. The North Atlantic profile shows an systematic increase from 0.6 pmol/kg at the surface to 1.7 pmol/kg at 2100m, whereas the Mediterranean profile is almost featureless at a mean concentration of 3.8 $\pm$ 0.6 pmol/kg. Those In concentrations are significantly higher than those of acid-soluble total In concentrations of ~ 0.1 pmol/kg in the North Pacific (Amakawa *et al.*, 1996; Alibo, 1997). The acid-soluble particulate fraction ranged from 30 to 60% of total indium in the Mediterranean which is comparable with those of Ce and Th. This suggests that In is categorized into one of the least soluble elements in seawater of having short mean oceanic redidence times less than a few hundred years. The deep water concentration varies in the order of Mediterranean > North Atlantic > North Pacific which is inverse of that of nutrients. The large inter-oceanic variation of dissolved In is comparable with that of Al, but the shape of the Mediterranean profile is different between dissolved In and Al suggesting that significant fractionation of the two elements is taking place in the ocean. Thus, simultaneous measurements In and Al may provide a mean to separate the variation in their concentrations due to physical mixing of water masses and geochemical processes which is required to evaluate the usage of those elements as chemical tracers.

The inter-oceanic variations of dissolved In and Al may be ascribed to the different intensities of external input of which major has been considered to be aeolian rather than fruvial. However, the magnitudes of the inter-oceanic variation are significantly greater than those of other refractory elements such as Ce, Ti, Ga and Zr whose major sources are also considered to be aeolian. Thus, additional sources such as solubilization and subsequent advective transport from shelf and slope sediments may be required for In and Al in the Atlantic and the Mediterranean.

References

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