

The distribution and origins of Pb isotopes in the Northeast Indian Ocean

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Stable Pb isotopes (²⁰⁴Pb, ²⁰⁶Pb, ²⁰⁷Pb and ²⁰⁸Pb) are used as a tool to identify natural and anthropogenic sources of Pb to the ocean. Compared to the Atlantic Ocean and Pacific Ocean, fewer studies on Pb isotopes have been done in the Indian Ocean. The purpose of this study is to obtain reliable data of Pb isotopes in seawater samples collected at 9 stations during the KH-18-6 Japanese cruise in November to December 2018 from the Bay of Bengal to the South Indian Ocean. 200 to 400 mL seawater samples were filtered through a 0.2 µm pore size filter and acidified with ultra-purity HCl onboard. They were analysed for Pb isotopes using ethylenediaminetriacetic acid chelating resin columns followed by isotopic measurement using a Neptune MC-ICP-MS.

Vertical profiles of salinity and isotope ratios obtained in this study at Station 4 of KH-18-6 Cruise are compared with those reported at ER-2 (8°31'N) and ER-3 in the equator during the KH-09-5 Japanese GEOTRACES cruise in 2009 [1]. Low-salinity water above 20 m with higher ²⁰⁶Pb/²⁰⁷Pb ratios are observed at Station 4 compared to those at ER-3. The low-salinity water at Station 4, located in the Bay of Bengal, thus received a stronger influence of fluvial origin Pb with high ²⁰⁶Pb/²⁰⁷Pb ratios [Norisuye et al. (unpublished data)]. Surface water at ER-3 is mainly occupied by high-salinity tropical waters accumulating anthropogenic Pb with low ²⁰⁶Pb/²⁰⁷Pb ratios [1]. A subsurface maximum of ²⁰⁶Pb/²⁰⁷Pb ratio which correspond to a dissolved oxygen minimum is observed at Station 4. In the depth ranges of 100-400 m at Station 4 and 100-1000 m at ER-2, the ²⁰⁶Pb/²⁰⁷Pb ratios are much higher than ER-3 whereas the levels of dissolved oxygen are much lower. This suggests reversible exchange combined with lateral transport of geogenic origin Pb with high ²⁰⁶Pb/²⁰⁷Pb ratios from reducing sediments developed in a wide area of the Bay of Bengal.

[1]. Lee, J.M., Boyle, E.A., Gamo, T., Obata, H., Norisuye, K. and Echegoyen, Y., 2015. *Geochim. Cosmochim. Acta* **170**, 126-144.