

## **Atmospheric input of seawater-dissolvable Pb using radioactive of $^{210}\text{Pb}$ in the western Indian Ocean**

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The distributions of dissolved Pb and radioactive  $^{210}\text{Pb}$  were determined in the water column of the western Indian Ocean. The vertical profiles of dissolved Pb ( $<0.2\ \mu\text{m}$ ), dissolved  $^{210}\text{Pb}$  ( $<0.45\ \mu\text{m}$ ), and total  $^{210}\text{Pb}$  were higher in the (sub)surface layer (0-100 m) and decreased with depth. Especially in the surface layer, both dissolved Pb concentrations and radioactive  $^{210}\text{Pb}$  activities were about 2-fold of reported values in previous studies (conducted by the GEOSECS program in same region in the 1977), suggesting that additional Pb input from water mass of surface layer travelling along surrounding continents. Based on mass balance of dissolved  $^{210}\text{Pb}$  budget in the water column, we tried to estimate the actual seawater-dissolvable input flux of Pb in Indian Ocean, for the first time. Atmospheric input of seawater-dissolvable  $^{210}\text{Pb}$  was estimated to be  $0.1\text{-}0.5\ \text{dpm cm}^{-2}\ \text{yr}^{-1}$ , and these values agreed well with the general global estimations for the major oceans ( $0.1\text{-}0.7\ \text{dpm cm}^{-2}\ \text{yr}^{-1}$ ). Considering the residence time of  $^{210}\text{Pb}$  (26-34 years) in the water column (estimated from  $^{210}\text{Pb}$  inventory and  $^{234}\text{Th}$ -based Pb scavenging rate), the atmospheric input of seawater-dissolvable Pb is quantified to be  $0.15\pm 0.04\ \text{nmol cm}^{-2}\ \text{yr}^{-1}$ , which is about 10 times higher than reported values in the 2009 in the same region. Determining Pb solubility in seawater has still been a challenging issue in relevant to diverse source of Pb in the ocean, thus this result suggest that radioactive Pb could be useful tracer for quantifying actual dissolvable Pb in seawater.