Surface Nd isotopic distribution in the South Pacific Ocean

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Nd isotopic distribution in surface waters was controlled by surrounding terrestrial sources, lateral transportation and mixing water masses. In the North Pacific Ocean, Nd isotopic compositions reflect weathering of island arcs around the circum-Pacific and show more radiogenic than those in the Atlantic and the Indian Ocean. In the South Pacific Ocean, however, Nd isotopes in seawater and their sources have not been investigated yet. The New Guinea Island and neighboring volcanic island were expected as mantle-derived sources in the South Pacific Ocean. On the other hand, unradiogenic Nd ($\varepsilon Nd < -9$) in the Southern Ocean could contribute as continental-derived sources.

We examined Nd isotopic distribution and its sources in surface waters of the South Pacific and the Southern Ocean. Seawater samples were collected by MnO2 impregnated fiber on the transects along 170ºW and 155ºE. These transect lines were set to observe from the Southern Ocean to the equatorial Pacific Ocean.

According to Nd isotopic distribution in the South Pacific and the Southern Ocean, oceanic regions were divided into the most radiogenic Coral Sea ($-1.6 < \varepsilon Nd < +0.4$), Tropical South Pacific Ocean ($-3.6 < \varepsilon Nd < -1.6$), unradiogenic Southern Ocean ($\varepsilon Nd \approx -9$) and the middle latitude region ($-8.2 < \varepsilon Nd < -0.9$). Each division corresponds to a major water mass in surface water. In the Tropical region, εNd values in the Coral Sea were more radiogenic than those along the 170ºW. Inflows to the Coral Sea from the South Equatorial Current showed the feature of mantle-derived Nd in the western South Pacific Ocean. Heterogeneous εNd distribution in the Coral Sea probably suggested various mantle-derived Nd sources not only the New Guinea Island but also other volcanic islands such as Bismarck Islands and Solomon Islands. In the Polar Frontal Zone and Antarctic Zone of the Southern Ocean, Nd isotopic compositions were unradiogenic and homogenous distribution between 54º S and 67.5ºS. Although surface salinity abruptly changed (33.8 - 34.7) at the Suantarctic Front (48º–51ºS), εNd values gradually increase from poleward of the Subantarctic Front (52ºS, $\varepsilon Nd = -8.2$) to 25ºS ($\varepsilon Nd = -0.9$). This gradient resulted in the mixing of the water mass having radiogenic Nd from the Coral and Tasman Sea with unradiogenic Southern Ocean.

Extent of Indian MORB mantle domain during the Cretaceous: Geochemistry of basement rocks in Luzon, Philippines

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We examined Cretaceous and Eocene groups of basalts and peridotites from ophiolitic complexes in Luzon, Philippines and found out that they possess Nd, Pb, and Sr isotope compositions similar to those of Indian Ocean mid-ocean ridge basalts (MORB). Each group is isotopically distinct from Pacific MORB and the younger group additionally has stronger subduction-influenced chemical signature. The Indian MORB-type isotopic signature in these rocks is shared by the Philippine plate basin lavas [1] and Philippine arc volcanics [2], believed to have been imported from their previous southern location within the modern-day region of DUPAL anomaly [1, 2]. Recent detailed paleomagnetic data [3] suggest substantial northward movement from equatorial latitudes of both the Cretaceous and Eocene rock groups, corroborating the interpretation that Luzon formed part of the oceanic basement of the Philippine Sea Plate (PSP) [3, 4]. Our results suggest that both the PSP and the Cretaceous basement rocks of Luzon originated from the same mantle source and, if true, imply that: (a) the Indian MORB-type mantle component may have been present in the sub-Philippine mantle since the Cretaceous and (b) the Indian MORB mantle domain may have extended as far north as the equatorial latitudes since the Cretaceous.

[1] Hickey-Vargas (1991) *Earth Planet. Sci. Lett.* **107,** 290-304. [2] Castillo (1996) *Geology* **24,** 271-274. [3] Queano *et al.* (2007) *J. Geophys. Res.* **112,** doi,10.1029/2006JB004506. [4] Pubellier *et al.* (2003) *Tectonophysics* **363,** 181-199.