Distribution of neodymium isotopes along the GEOTRACES Eastern Pacific Zonal Transect

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The GEOTRACES Eastern Pacific Zonal Transect (EPZT, GP16) from Peru to Tahiti provides a great opportunity to understand sources, sinks and cycling of neodymium (Nd) in the ocean as well as how well Nd isotopes behave as a conservative water mass tracer because the EPZT crosses different environments, including a continental margin, an oxygen minimum zone, an oceanic ridge, and open ocean. We report the distribution of dissolved Nd isotopes from 21 stations in the EPZT. Most of the surface samples, from 0 to ~10 m, show εNd-values between -2 and -1, reflecting terrigeneous contributions from South America. εNd-values of shallow samples, from ~10 to ~500 m, range between -4 and -1, consistent with εNd-values of Equatorial Subsurface Water, Eastern South Pacific Intermediate Water, and South Pacific Central Water. Above and west of the East Pacific Rise (EPR), below ~500 m, εNd-values gradually decrease with depth, reflecting contributions from Antarctic Intermediate Water (εNd = -7), Circumpolar Deep Water (εNd = -8), and Antarctic Bottom Water (εNd = -8). However, from ~2300 to 2800 m, the EPR and western stations show an increase of εNd, as high as 1 εNd-unit at the EPR. This indicates that hydrothermal Nd can modify seawater εNd near the EPR. East of the EPR, seawater shows higher εNd-values compared to west of the EPR, especially for stations from 84°W to the Peruvian margin between ~500 and ~2000 m water depth. The higher εNd-values close to the Peruvian margin could be attributed to Nd contributions from marginal sediments. Below ~2000 m, εNd-values on the eastern side of the EPR range between -4 and -3, indicating dominance of Pacific Deep Water (εNd = -4). These results indicate that Nd isotopes in the open ocean largely behaves as a conservative water mass tracer, while deviations from conservative behavior are observed close to continental margins and from hydrothermal input.