

Nd Isotopes and REE

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The US GEOTRACES Science Plan, 2006 targeted Nd isotopes as a part of a suite of key trace elements and isotopes (TEIs) that should be analyzed in every ocean section associated with the program. The value of Nd isotopes as an oceanographic and paleoceanographic tracer is increasingly recognized in the scientific community. Our group is part of the US North Atlantic Zonal Transect. In addition, our group participated in the recent European Geotraces South Atlantic Sectional Cruise (Punta Arenas – Canary Islands), where we successfully recovered ca. 300 seawater samples, where we hope (pending funding) to analyze a subset for Nd isotopes and rare earth elements patterns (REE).

The proposed Peru-Tahiti section provides a unique opportunity use Nd isotopes trace Pacific circulation. The Peruvian margin hydrography is tightly coupled with the eastern equatorial Pacific (EEP) hydrographic features such as the equatorial upwelling. Steve Goldstein and Leopoldo Pena have been working on the characterization of the water masses in the EEP using Nd isotopes, including possible changes over the time in the flow of Subantarctic Mode Water to the EEP in the past with changing climate. This involves comparison of Nd isotopes in planktonic foraminifera with EEP water samples. The Geotraces transect would greatly enhance our ability to pursue this project.

Moreover, the acquisition of the Nd isotopic fingerprint in the Pacific is still not well understood, and it is necessary to fully understand this in order to effectively use Nd isotopes as a water mass tracer to address present and past ocean circulation.

Thus, the Peru-Tahiti section will give us further insights into how to link mid and low latitude processes in the ocean and would complement some currently ongoing research lines at LDEO.