Determining the Deep Water Mass Transport in the East Equatorial Pacific during glacial Terminations using Neodymium Isotopes in Benthic Foraminifera

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The ocean's thermohaline circulation has a direct impact on the earth's changing climate as it is a major source of heat in the earth's heat budget as well as a source of dissolved chemicals. The Southern Ocean serves as a major source of these dissolved chemicals for the interior ocean basins, thus past climatic changes may be a result of a variation in ocean circulation. The incidence of the Antarctic Intermediate Water (AIW) and the Antarctic Bottom Water (ABW) in the Pacific Ocean supplies the Equatorial Pacific with dissolved chemicals. The goal of this research is to unravel the variability in the deep ocean circulation in the Eastern Equatorial Pacific (EEP) as it relates to the changes in climate from glacial to interglacial periods. Neodymium (Nd) isotope compositions in benthic foraminifera were used to re-create past profiles of the deep ocean mass transport during de-glaciations. Neodymium isotopes were preferable for analysis because it is distinct for different water masses; it is more positive in the Pacific in comparison to the Atlantic, and has an intermediate value in the Southern Ocean; and in addition, it has a residence time on the same magnitude as the ocean circulation. The sample site was located at the ODP Site 1240 located 0° N and 86° W in the Panama Basin. Samples were taken from a depth ranging from 0.41 to 3.20 meters below sea floor, which correlates to an age between 3,000 to 20,000 years ago or the period of de-glaciation after the Last Glacial Maximum (LGM). Benthic samples are picked, cleaned and dissolved, and then Nd is separated in a two-stage process, first separating the rare earth elements from the matrix and then separating the Nd from the other rare earth elements. The isotope composition is measured as NdO on rhenium filaments with silica gel, by thermal ionization mass spectrometer (TIMS). A "zig-zag" Nd time series profile is expected to be observed during interglacial periods because of the comparatively different Nd composition in the Pacific and Southern Ocean. However, since the LGM was associated with a decline in the intensity of the North Atlantic Bottom Water (NABW), the Nd isotope composition of the Southern Ocean would increase in value, closer to that of the Pacific. Hence, we propose that this increase will result in a Nd composition of the AIW more similar to that of the Pacific Deep Water (PDW). If the NADW input is small enough Pacific and Southern Ocean endmembers will be the same and instead of a "zig-zag" Nd profile a straighter, constant profile will be observed from the AIW to the PDW during glacial periods.

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- **What?**

Unraveling the variability of deep water mass transports with particular focus on glacial Terminations

- **Where?**

East Equatorial Pacific: Panama Basin

- **Why?**

To gain an understanding of the variability of the deep ocean circulation in this region.

How does glacial-interglacial transitions affect the deep ocean circulation.