

The Nd isotopic composition of past North Atlantic Deep Water from deep-sea corals in the North Atlantic

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Abstract

I request funds to carry out a pilot study using deep-sea corals from the North Atlantic as archives for the Nd isotopic composition of North Atlantic Deep Water (NADW) over the last glacial cycle. Nd isotopes are an emerging tracer for ocean circulation and water mass mixing. However, we do not know the endmember isotopic composition of North Atlantic Deep water in the past due to coarse resolution of ferromanganese crusts, and detrital contamination of dispersed authigenic ferromanganese precipitates in marine sediments. Deep-sea corals are an excellent archive of ocean history and can be precisely dated with U-Th dating. Based on the marine $\square^{234}\text{U}$ and the low initial Th that is attainable in carefully cleaned corals, it is a safe assumption that the rare earth element (REE) abundances and Nd isotopic compositions also reflect ambient seawater. Accordingly if a routine procedure for measuring low Nd isotope abundances can be developed, this approach can be used to constrain whether the Nd isotopic composition of NADW has remained unchanged over the last glacial cycle. If it has changed, however, this has important implications for how weathering style influences the Nd composition of seawater. Additionally, the data generated by this pilot study will help to separate endmember composition changes from deep water movement changes.