

Tracing Water Mass Mixing and Terrestrial Inputs with Radiogenic Neodymium and Hafnium Isotopes in the Southeastern Atlantic

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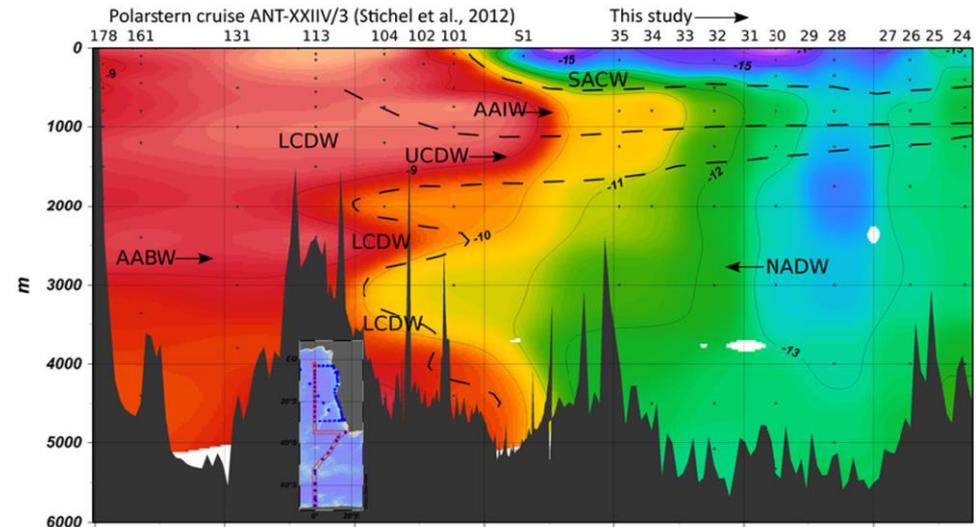
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Hf and Nd isotopes can be used as tracers of present and past water mass mixing and continental inputs given that the residence time of Hf and Nd in seawater is similar to or somewhat shorter than the mixing time of the ocean. It is unclear if these isotopes can be applied in restricted basins such as the Angola Basin with a sluggish water mass exchange and large continental inputs such as via the Congo River.

The goal was to test the use of the combined Hf-Nd isotopes together with Rare Earth Elements tracers of water mass mixing in the Angola Basin and northernmost Cape Basin. The samples were taken along full water column sections during RV Meteor cruise M121 (GEOTRACES cruise GA08) in 2015.

The results of the study show that the surface water Nd/Hf isotope compositions are strongly affected by exchange with the ocean margins and surface currents from West Africa and even via the Agulhas Current. The Congo is found to be a major supplier of REEs and Hf that can be traced for more 1000 km from its mouth. In waters between 2000 and 4000 m the Nd isotopes show conservative behaviour except in the central Angola Basin where Nd is released from Fe-oxide coatings of sinking particles.



Nd isotopic compositions of the Angola Basin and Cape Basin from this study, together with data from cruise ANT-XXIIV/3 (Stichel et al., 2012a,b). Dashed lines indicate approximate boundaries of the prevailing water masses. Sections were produced using Ocean Data View (Schlitzer, 2019) and modified manually.