

Cd Isotope Signatures of Seawater, Suspended Particulate Matter, and Surface Sediments from the UK GEOTRACES 40°S transect

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Marine organisms utilize cadmium (Cd) in the oceans with a preferential uptake of light Cd isotopes. The Cd isotope system may therefore be a promising tool to understand past nutrient utilization and ocean mixing. However, the relationship between Cd isotope compositions in recently deposited sediments and those in both overlying waters and suspended particulates is poorly understood.

This work aims to analyze the Cd isotopic composition and concentration of near-surface seafloor sediments, waters and suspended particulates from the East Mid-Ocean Ridge and a transect of five sites on the continental slope and shelf of the Argentine Basin. The samples were collected by UK GEOTRACES cruises between 2011 and 2012.

Results suggest that Cd concentrations in near-surface sediment profiles are sensitive to changes in redox state, an argument which is supported by a covariance between Cd and Mn concentrations. Both Cd and Mn display an enrichment spike associated with peak nitrate reduction. The Cd spike corresponds to a negative excursion in the Cd isotopes and may be caused by H₂S forming insoluble CdS. The overlying water column exhibits a characteristic nutrient depth profile, similar to phosphate, with low Cd concentrations and heavy Cd isotope values near the surface and increased Cd concentrations and lighter Cd isotope values in deep waters. The completed measurement of the samples will further our understanding of Cd cycling in modern oceans, and the potential of Cd isotopes as a paleoproductivity indicator in ancient oceans.