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Neodymium Isotope Evidence for Corresponding Rapid Sediment Source Changes and MIS 3 Climate Oscillations at Bermuda Rise

S. M. Higgins (1), S. Hemming (1), and E. A. Boyle (2)

(1) L-DEO of Columbia University, Palisades, NY USA, (2) Department of Earth Atmospheric and Planetary Sciences, MIT, Cambridge MA USA (sean@ldeo.columbia.edu)

The Bermuda Rise is well located in the open western Atlantic Ocean to track deep-water circulation changes and to track climate changes in the subtropical Atlantic Ocean. Detailed published work on one core MD95-2036 at the Bermuda Rise provides a very high temporal resolution framework that offers a near-unique opportunity to link surface climate proxies, deep ocean circulation proxies and sediment transport constraints to better understand the processes controlling the marine sediment record at this drift site. Sedimentation rates during Marine Isotope Stage 3 average 30 to 40 cm/ka but range from 20 cm/ka (interstadials) to $>$100 cm/ka (stadials). A recent high-resolution study of alkenone-derived sea surface temperature (SST's) showed approximately 6˚C range in temperature across the Dansgaard-Oeschger events, with a remarkable pattern match to the ^{18}O of the GISP2 ice core. The subsequent discovery of significantly older ^{14}C ages of bulk organic matter and alkenones compared to those of foraminifera from same depth horizons has highlighted the problem that the alkenone-derived SST's at Bermuda Rise are likely biased from advection of fine sediments from the northwest Atlantic. This would suggest significant lateral transport of alkenones, presumably from the north with a colder SST signal, but also presumably variably with climatic change. The puzzle then is to explain the fidelity of the pattern match between the inferred temperature variations from the alkenone record and the inferred Greenland temperature variations from the ^{18}O of GISP2 ice in the context of observed sediment fluxes to this location. To constrain the sediment sources we have measured the neodymium isotope composition of samples across a strong climate oscillation, IS8 to IS9, approximately 35 to 40 ka. The 4 epsilon unit range in composition varies with apparent temperature such that the warmer values correspond

to lower neodymium isotope ratios. The distribution of geological terrains is such that lower neodymium isotope ratios (older terrains) are found moving northward in the western Atlantic, into the Labrador Sea. Thus the implication of the results is that a greater contribution of further-transported sediment characterizes warm intervals. If the concentration of alkenones is approximately similar for different sediment sources, this would tend to bias the alkenone SST estimates towards a decreased magnitude at this site during climate oscillations.