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Neodymium isotopes on the Bering/Chukchi shelf into the Canada Basin

Brian Duggan (1), Wayne Buckley (1), Brian Haley (2), Steven Goldstein (3), Leopoldo Pena (4), and Howie Scher (1)

(1) Marine Science Program & School of Earth Ocean and Environment, University of South Carolina, Columbia, South Carolina, USA (bduggan@geol.sc.edu), (2) College of Earth, Ocean and Atmospheric Sciences, Oregon State University, Corvallis, Oregon, USA, (3) Lamont-Doherty Earth Observatory, Columbia University, Palisades, New York, USA, (4) Dept. Of Dynamics of Earth and the Ocean, University of Barcelona, Barcelona, Spain

We analyzed dissolved neodymium (Nd) isotopes from five high-resolution profiles (two shelf, one shelf break, and two open ocean stations collected during the US GEOTRACES Arctic expedition HLY1502) in the Canada Basin in order to further constrain the sources and sinks to the Arctic and global ocean as a whole. In seawater, dissolved Nd retains the isotopic provenance of the water mass and behaves as a quasi-conservative tracer, however, the isotopic composition can be altered by processes such as reversible scavenging, boundary exchange, and groundwater flux. As such, the Arctic Ocean, having the largest fraction of continental shelves, freshwater input, and sea ice of any major ocean, and is connected to the global ocean through two shallow gateways, provides an ideal study area.

Surface waters along the shelf are dominated by Pacific throughflow with an εNd of $\sim$ -4.0, while those in the Canada Basin are increasingly less radiogenic with contributions from riverine sources. Sub-halocline waters in the area are characterized by a constant εNd of $\sim$ -9.5. Previous studies examining Nd in the Arctic have shown the Nd isotopic composition of sub-halocline waters are primarily Atlantic in origin (εNd = -10.8; Anderson et al., 2008), entering through the Fram Strait. Where deep water along the Chukchi slope was thought to be anomalously radiogenic εNd of $\sim$ -9.5 compared to -10.5 in the Makarov Basin and -12.3 in the Amundsen Basin (Porcelli et al., 2009). Moreover, an even more radiogenic value was obtained from the authigenic coating of Chukchi slope sediment (εNd = -4.9; Haley and Polyak, 2013). These observations suggest either the nonconservative addition of a radiogenic margin component or Pacific water subducted to a greater depth as a result of brine rejection induced transport to contribute to the relatively radiogenic Atlantic component.