Nitrate isotope distributions along the Canadian Arctic GEOTRACES transect: Implications for high-latitude nitrogen cycling

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The Canadian Arctic Ocean plays a key role in the marine nitrogen cycle by connecting the North Pacific, an area of active denitrification, with the North Atlantic, a region of extensive N_2 fixation. Here, we will present water column natural abundance nitrogen (N) and oxygen (O) isotope ratios of nitrate (NO_3^-) collected during the Canadian Arctic GEOTRACES expedition in July and August 2015 along a transect from the Canada Basin through the Canadian Archipelago and into the Labrador Sea. These data shed light on both the origin and internal cycling of nitrate in the Canadian Arctic.

Isotope values at the western end of the transect are consistent with previous findings showing a pronounced enrichement in $\delta^{15}N$ and a coincident minimum in $\delta^{18}O$ in the Canada Basin upper halocline layer, indicative of both benthic denitrification upstream on the Bering and Chukchi shelves and remineralization processes along the transit. This subsurface peak in $\delta^{15}N$ of NO_3^- associated with the cold Pacific-derived halocline shows a progressiv decrease along a west-to-east transect, from ~8‰ in the Canada Basin to ~7‰ in southern Lancaster Sound and ~6‰ in central Baffin Bay. Concurrently, we see an overall decrease in subsurface NO_3^- concentrations associated with the halocline nutrient maximum along the flow path, from ~16 µmol L^{-1} west of the Archipelago to ~10 µmol L^{-1} in Lancaster Sound. The concurrent minimum in $\delta^{18}O$ of NO_3^- in the upper halocline seems largely preserved throughout its transit through the Archipelago. The trends in NO_3^- isotope ratios and nutrient concentrations described here will be discussed in the context of regional circulation patterns and N biogeochemistry in the central Archipelago.