Changes in the bottom water Nd isotope composition on the Bering Slope over ~530 kyrs

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Bering Sea is the northernmost marginal sea of the Pacific Ocean, joining with the Arctic Ocean through the shallow Bering Strait. Because this sub-polar region is sensitive to the climate change, understanding the paleoenviromental change in this region is important. In particular, during periods of reduced North Atlantic Deep Water formation, bottom water formation in the Bering Sea and North Pacific may have driven poleward oceanic heat transport [1]. This hypothesis can be tested by reconstructing the temporal variation of the bottom water composition. We analyzed the neodymium isotope ratios of Fe-Mn oxide coatings on marine sediments obtained from the Bering Slope (site U1345; water depth 1,008 m) during the Integrated Ocean Drilling Program Expedition 323. The average ε_{Nd} value over the last 530 kyrs was -3.1±1.7 (2σ, n=149), and we observed large temporal deviations from it that did not all coincide with climatic variations. Radiogenic ε_{Nd} excursions (up to -0.6) were generally associated with the high GRA bulk density, NGR counts and magnetic susceptibility and low color reflectance b* value. These indicate low opal productivity, possibly related to enhanced sea ice formation and consequent vigrous brine rejection triggering sinking of radiogenic surface water. On the other hand, the non-radiogenic ε_{Nd} excursions (down to -5.4) were mainly accompanied by low GRA bulk density, NGR counts and magnetic susceptibility and high b* values. The non-radiogenic N. America sourced water may affect bottom water composition but we do not find suitable dense water formation mechanism which satisfies a high opal productivity environment. Alternatively, boundary exchange with sinking particles transported from N. America, e.g. weathering products delivered by the Yukon, is also conceivable.

[1] Okazaki *et al* (2010) *Science* **329**, 200-204