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Holocene fluctuations of neodymium isotope ratios in eastern Fram Strait sediments – An indication for deepwater variability?

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The Fram Strait as the only deep water connection of the world's oceans to the Arctic plays a substantial role for the heat influx to the Arctic Ocean and controls freshening of the Nordic Seas through Arctic sea ice export. Large amounts of warm and saline Atlantic Water derived from the North Atlantic Drift transport most of the heat through eastern Fram Strait to the Arctic basin, resulting in year-round ice-free conditions. Arctic sea ice and cold and fresh waters exit the western part of the strait southward along the Greenland shelf. However, little is still known about the water mass transport at intermediate and bottom water depths in the Fram Strait. High-resolution Holocene sediment sequences from the Western Svalbard margin have been investigated for its neodymium isotope ratios stored in ferromanganese oxyhydroxide coatings of the sediment to derive information on the source of bottom seawater passing the site. The radiogenic isotope data are compared to a multitude of proxy indicators for the climatic and oceanographic variability in the eastern Fram Strait during the past 8,500 years. In order to obtain a calibration of the Nd isotope compositions extracted from sediments to modern bottom water mass signatures in the area, a set of core top and water samples from different water depths in the Fram Strait was additionally investigated for its present-day Nd isotope signatures. A significantly higher inflow of deepwater produced in the Nordic Seas to the core site is inferred for the earlier periods of the Holocene. Cooler surface water conditions and increased sea ice abundances during the late Holocene coincide with more radiogenic Nd isotope ratios likely resembling the neoglacial trend of the northern North Atlantic.