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Holocene intermediate and bottom water mass reconstructions of the western Barents Sea

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The Atlantic Meridional Overturning Circulation (AMOC) is an important component of the Earth's climate system. It brings warm and saline water to the northern latitudes by the North Atlantic Current (NAC) and causes the formation of deep water which flows back to the south. Variability in the AMOC can affect the convective formation of deep water in the Nordic Seas and thereby the global ocean circulation. Additionally, the inflow of the NAC is essential for the ecological conditions at higher latitudes as any changes of this warm inflow have large consequences. Hence, it is crucial to establish the natural range of oceanographic fluctuations. During the Holocene both atmospheric and oceanic temperatures generally decreased. However, many smaller temperature fluctuations have been observed superimposed on this general cooling trend.

Warm Atlantic water flows into the Barents Sea as the northern continuation of the NAC. The warm Atlantic waters are separated from the colder Arctic waters by the Polar Front. We have chosen a core location close to the Polar Front in order to study any changes in the inflow of Atlantic Water to the Barents Sea during the Holocene. A sediment core from the Kveithola trough, western Barents Sea margin, is studied at decadal to centennial time scale. Benthic foraminiferal assemblages have been analyzed in addition to stable isotopes (δ18O and δ13C) and Mg/Ca ratios.

The first results of the benthic foraminiferal assemblages show a general Holocene warming trend for the western Barents Sea. Cold water associated species such as Elphidium excavatum are replaced by cooled Atlantic Water associated species (Cassidulina neoteretis, Cassidulina reniforme) around 9500 cal. yr. BP. A lithological shift and a drop in total organic carbon (TOC) is observed around 8400 cal. yr. BP and might indicate a change in water mass. The benthic foraminiferal assemblages show a stable trend during mid-Holocene and the assemblage is dominated by C. neoteretis and C. reniforme. Additionally, we will present data on Mg/Ca ratios and stable isotopes, both measured on the species C. neoteretis, which enables an independent reconstruction of salinity and temperature throughout the Holocene.