



## **Atlantic Water flow in the Arctic Ocean: Multiproxy evidence for variable pathways during Late Quaternary warm periods**

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Today, the patterns of Atlantic Water advection and its pathways within the Arctic Ocean are clearly determined by the Coriolis force. Having entered the deep-sea Arctic Ocean basin, the core of this warm and salty water mass turns eastward and can be traced as a counterclockwise intermediate water current along the entire Arctic continental margin. Additionally, the Atlantic Water spreads as a subsurface water mass in the interior Arctic Ocean.

For the past, pathways of Atlantic Water in the Arctic Ocean can to a certain extent be traced by the distribution of microfossils clearly associated with this water mass, e.g., the subpolar planktic foraminifer *Turborotalita quinqueloba*. New foraminiferal and isotopic data sets from sediment cores obtained from the Lomonosov and Mendeleev ridges, supplemented by data from refined analyses of older core material, reveal the flow pattern of Atlantic Water during the three pronounced warm periods since the penultimate glaciation: Marine isotopic (sub) stages (MIS) 1, 5a, and 5e. High-resolution records of MIS 1 show that *T.quinqueloba* abundances rapidly decrease north and northeast of 80°N. In the interior Arctic Ocean, MIS 1 sediments are barren of *T.quinqueloba*. In contrast, faunal and isotopic records reveal a strongly different picture for parts of MIS5e (Eemian) and MIS 5a. For the early half of these relatively mild climatic intervals, our data suggest a noticeable advection of Atlantic Water, yet of rather low temperature and likely at depths comparable to the modern distribution (i.e. below 150 m) or even deeper. This may be explained by a thick layer of low saline waters near the surface which possibly stemmed from the slow melting of ice sheet remnants on the Eurasian continent and shelves. In the second half of both MIS 5a and 5e, Atlantic Water advection was still strong, but likely occurred at shallower depths, as indicated by unusually large amounts of small *T.quinqueloba* in central Arctic sediments. Subsurface Atlantic Water may have been diverted northward from the Fram Strait and spread eastward along the Lomonosov Ridge. One can only speculate on the possible reasons for these flow path changes. A density structure in the Eurasian Basin that was different from today may have been involved, as well as changes in the freshwater run-off. In any case, the results suggest an interglacial circulation patterns of Atlantic Water in the Arctic Ocean that was different from the present one.