

## Severe Cooling of the Northwest Atlantic Ocean During the Holocene

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Detailed sea surface temperature records from the slopewaters east of the USA and Canada indicate that substantial, near-monotonic cooling of 4-10 degC began ~11,000 years ago and continues unabated to the present. That SST records from the Northeast Atlantic and air temperature records from Central Greenland indicate only moderate (~1-3 degC) cooling during the Holocene suggests that ocean-atmosphere dynamics acted to magnify the cooling we observe on the western side of the Atlantic, where the slopewaters are characterized by the interaction between cold, fresh Labrador Current waters and warm, salty Gulf Stream waters.

Several hypotheses are presented to explain the severe cooling of NW Atlantic slopewaters during the Holocene. First, we propose that decreasing summer insolation at high northern latitudes had a direct radiative effect on the slopewaters. Second, we hypothesize a large equatorward shift in the mean position of the Gulf Stream, from east of Newfoundland in the early Holocene to east of the Mid-Atlantic Bight today. Third, we speculate that North Atlantic climate evolution during the Holocene was analogous to an extended positive phase of the North Atlantic Oscillation. Finally, we suggest that cooling of the Northwest Atlantic slopewaters is an important prelude to the expansion of perennial ice in Northeastern Canada and the start of the next glacial period.