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# Late Holocene sea surface temperature seesaw between the subpolar North Atlantic and the Norwegian Sea inferred from two marine sediment cores

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A 2800-yr-long August sea surface temperature (aSST) record based on fossil diatom assemblages is generated from a marine sediment core Rapid 21-COM recovered in the Iceland Basin (northern subpolar North Atlantic). The record has a resolution of 2–10 years for interval 800–2004 AD representing the best resolved diatom SST reconstruction from the subpolar North Atlantic for this period, and 40 years for interval 800 BC–800 AD. The record is compared with the high-resolution (4-20 years) aSST record from core CR948/2011 from the Vøring Plateau, in the Norwegian Sea, to explore the variability of the aSST gradient between these areas during the late Holocene.

The two aSST records show persistent opposite climate trends toward warming in the subpolar North Atlantic and cooling in the Norwegian Sea throughout the late Holocene. The wavelet analysis reveals an apparent tendency to coherent antiphased aSST variations between the sites for the shorter time scales too, implying a possible aSST seesaw between the northern subpolar North Atlantic and the Norwegian Sea to operate during the late Holocene. At the multicentennial scale of aSST variability of 600–900 years, the records are nearly in antiphase with warmer (colder) periods in the subpolar North Atlantic corresponding to the colder (warmer) periods in the Norwegian Sea. At the shorter time scale of 200–450 years the records display a nearly phase-locked behaviour with a tendency for the positive aSST anomalies in the Norwegian Sea to lead by ca. 30 years the negative aSST anomalies in the subpolar North Atlantic. This aSST seesaw might have had a strong effect, or be associated, with the two major climate anomalies in the northwest Europe during the past Millennium: Medieval Warm Period (MWP) and the Little Ice Age (LIA). During the MWP warming of the sea surface in the Norwegian Sea occurred in parallel with cooling in the northern subpolar North Atlantic, whereas the opposite pattern emerged during the LIA.

Coupled changes in aSST between the northern subpolar North Atlantic and the Norwegian Sea may indicate common driving forces behind the observed variability. The emerging spatial pattern of aSST resembles the one predicted by some modelling studies and is associated with changes in the regimes of the North Atlantic overturning circulation (AMOC). The observed aSST seesaw between the subpolar North Atlantic and the Norwegian Sea could be a surface expression of the variability of the eastern and western branches of the AMOC with a possible amplification through atmospheric feedback.