Geophysical Research Abstracts
Vol. 21, EGU2019-18366, 2019
EGU General Assembly 2019


# Exceptional Industrial-era penetration of subtropical water into the Northeast Atlantic linked to AMOC Weakening

Peter Spooner (1), David Thornalley (1), Delia Oppo (2), Alan Fox (3), Svetlana Radionovskaya (1), Kitty Green (1), Neil Rose (1), Tanya Monica (1), Laura Thrower (1), Robbie Mallett (1), Emma Cooper (1), and Murray Roberts (3)

(1) University College London, Geography, United Kingdom (p.spooner@ucl.ac.uk), (2) Woods Hole Oceanographic Institution, Geology and Geophysics, USA, (3) University of Edinburgh, School of Geosciences, UK

Several recent studies have uncovered exceptional recent changes in North Atlantic temperature structure and deep western boundary current flow speed, pointing to an ongoing decline in the Atlantic Meridional Overturning Circulation (AMOC) since around 1850 CE. The North Atlantic Current (NAC) is a major AMOC pathway via which upper-ocean waters are transported northwards. In recent decades, there has been pronounced variability in the properties of the NAC and subpolar gyre (SPG), with warm and salty conditions and declining nutrient concentrations observed during 1997-2010 CE. The causes of these changes may include AMOC variability but remain disputed. Here, we present foraminiferal abundance and nitrogen isotope ratios in exceptionally resolved marine sediment cores from the northern Iceland Basin, a region highly sensitive to changes in the NAC and the subpolar gyre and important in the NAC throughflow to the major deep-water formation regions. Our high-resolution records reveal that the recent increase in the occurrence of warm oligotrophic conditions was unprecedented for the past 10,000 years and was part of a much longer-term reorganisation of the surface circulation of this region, beginning around 1750 CE and continuing throughout the 20th century. The timing and exceptional nature of this event have strong similarities with records of AMOC strength, and we suggest how these can be mechanistically linked via the gyre circulation. The changes in surface circulation likely had, and may continue to have, a strong bottom-up control on regional marine ecosystems and the properties of the Atlantic water entering the Nordic seas.