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# Attributing Recent Variability in the AMOC to Surface Buoyancy-Forcing

**Charlotte Marris** and Robert Marsh
University of Southampton, European Way, Southampton, SO14 3ZH, UK United Kingdom of Great Britain – England, Scotland, Wales

Variability in the Atlantic Meridional Overturning Circulation (AMOC) on interannual to multidecadal timescales can primarily be linked to the strength of deep-water formation in the subpolar North Atlantic, where surface buoyancy-forcing transforms light surface waters to the dense waters of the southward-flowing lower-limb of the AMOC. The role of surface buoyancy-forcing in driving AMOC variability is of consequence for the regional transport and distribution of heat, carbon, and nutrients, and thus its quantification is essential for predicting how the AMOC will respond to and influence future global climate change. In a water mass transformation (WMT) framework, fields of surface density flux and surface density from the GODAS ocean reanalysis are used to reconstruct the surface-forced overturning circulation (SFOC) streamfunction for the subpolar North Atlantic (45-65 °N) over 1980-2020. The SFOC reconstruction is longitudinally partitioned into an East component, comprising the Irminger/Iceland basin, and a West component, comprising the Labrador Sea. Interannual changes in the dominant location of deep-water formation in the subpolar North Atlantic are thus elucidated. The reconstructed overturning is also partitioned in density, to separate contributions from two major North Atlantic water masses – Labrador Sea Water (LSW) and Subpolar Mode Water (SPMW) – which are inherently linked to variability associated with the North Atlantic Oscillation (NAO), influencing WMT across the subpolar North Atlantic. The analysis provides transport estimates complementary to those obtained with observations from the OSNAP array since 2014, revealing that recent (post-2014) domination of overturning by SPMW formation in the eastern subpolar gyre may be transient.