EGU2020-3615
https://doi.org/10.5194/egusphere-egu2020-3615
EGU General Assembly 2020

Link between transformation rate and overturning in the Iceland Basin and Irminger Sea

Tillys Petit[1], Susan Lozier[1], Simon A. Josey[2], and Stuart A. Cunningham[3]
[1]Division of Earth and Atmospheric Sciences, Georgia Institute of Technology, Atlanta, GA, USA
[2]National Oceanography Centre, Southampton, UK
[3]Scottish Association for Marine Science, Oban, UK

The Atlantic Meridional Overturning Circulation (AMOC), a key mechanism in the climate system, transforms warm and salty waters from the subtropical gyre into colder and fresher waters in the subpolar gyre and Nordic Seas. To measure the mean AMOC and its variability at subpolar latitudes, the Overturning in the Subpolar North Atlantic Program (OSNAP) array was deployed in the summer of 2014. Based on observations through May 2016, the majority of the light to dense water conversion takes place north of the OSNAP East line, which runs from the southeast tip of Greenland to the Scottish shelf. In this study, we assess the transformation of dense waters in the area located between the Greenland-Scotland Ridge and the OSNAP East section. From 2014 to 2016, the mean overturning within this area is estimated at 6.9 ± 1.3 Sv across σ_0 = 27.55 kg m^{-3}, the isopycnal that separates the northward and southward flows. This mean overturning estimate is in close agreement with the value (6.5 ± 1 Sv) derived by applying water mass transformation theory to air-sea buoyancy fluxes from atmospheric reanalysis. However, the large monthly variability of the overturning (standard deviation of 4.1 Sv) cannot easily be attributed to the buoyancy forcing or to variability in the overflow through the Greenland-Scotland Ridge. We explore possible mechanisms that can account for this variability.