Meeting AMOC Observation Needs in a Changing Climate



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Observing the oxygenation of the Denmark Strait Overflow Water in the Irminger Basin

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Direct observations of dissolved gases in the Subpolar North Atlantic are scarce, particularly during the winter and along boundary current systems. Consequently, current understanding of the physical processes governing the sequestration of dissolved oxygen into the deep North Atlantic is limited. One proposed pathway through which oxygen-enriched waters enter the deep ocean is the Denmark Strait Overflow Water (DSOW). Formed from buoyancy loss in the Nordic Seas, DSOW spills over the sill of the Denmark Strait into the Irminger Basin, feeding the lower limb of the Atlantic Meridional Overturning Circulation (AMOC). While DSOW is thought to entrain Arctic-origin, Atlantic-origin, and Labrador Sea Waters (LSW) near the sill, the proportions of water masses that become entrained into the overflow plume and their variability over seasonal and interannual timescales remain unclear. Here we use an optimum multiparameter (OMP) framework to investigate the water-mass composition of DSOW in the western boundary current of the Irminger Basin. BGC-Argo float data will be used to constrain the properties of source DSOW in the Nordic Seas and additional end-member water types in the Irminger Basin. OMP analysis will be performed on the OSNAP mooring array along the western boundary current region of the Irminger Basin, where oxygen sensors were recently deployed in summer 2020. This study underscores the importance of in situ oxygen measurements to understand entrainment processes in the Subpolar North Atlantic and its role in the uptake and storage of biogeochemically important gases.

Topic

Observational priorities -what should we measure?

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