



Reconciling tracer and float observations of the export pathways of Labrador Sea Water

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For the last fifty years, it has been hypothesized that the Deep Western Boundary Current (DWBC) is the continuous, principal conduit of the deep limb of the Atlantic Meridional Overturning Circulation (AMOC). An observation that contributes to this hypothesis is that the waters of the DWBC have greater velocities and are younger than the ocean interior, with the age of the waters determined from passive tracers such as chlorofluorocarbons and tritium. Observations of float trajectories from the past decade along with modeling and theoretical studies, however, have established the existence of an interior pathway as an alternate export pathway for the deep limb of the AMOC between the subpolar and subtropical gyres. Here, we explicitly test the relationships between export pathways, tracer distributions, and water age by comparing the spreading of observed and simulated passive tracers with the spreading of ensembles of simulated Lagrangian particles in high-resolution ocean models. We find that the spreading of tracers in an eddy-permitting ocean general circulation model is similar to observations, equatorward transport in the basin interior is consistent with the large-scale vorticity balance at depth, and despite higher, localized concentrations of particles in the DWBC, the interior pathway from the subpolar and subtropical basins is significant compared to the DWBC pathway.