On the transports connected with the AMOC in the subpolar North Atlantic

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Results from an interannually forced, 0.08° eddy-resolving simulation based on the Hybrid Coordinate Ocean Model, in conjunction with a small but well-determined transport database, are used to investigate the currents and transports associated with the Atlantic meridional overturning circulation (AMOC) in the subpolar North Atlantic (SPNA). The model results yield a consistent warming in the western SPNA since the early 1990s, along with mean transports similar to those observed for the trans-basin AMOC across the World Ocean Circulation Experiment hydrographic section AR19 (16.4 Sv) and boundary currents at the exit of the Labrador Sea near 53°N (39.0 Sv) and east of the Grand Banks near 43°N (15.9 Sv).

Over a 34 year integration, the model-determinedAMOC across the AR19 section and the western boundary current near 53°N both exhibit no systematic trend but some long-term (interannual and longer) variabilities, including a decadal transport variation of 3–4 Sv from relatively high in the 1990s to low in the 2000s. The decadal variability of the model boundary current transport near 53°N lags the observed winter time North Atlantic Oscillation index by about 2 years and leads the model AMOC across the AR19 section by about 1 year. The model results also show that the long-term variabilities are low compared to those on shorter time scales. Thus, rapid sampling of the current over long time intervals is required to filter out high-frequency variabilities in order to determine the lower frequency variabilities of interest.