Transport of Nordic Seas Overflow Water in the Northernmost North Atlantic: Insights from Eddy-resolving Simulations

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Results from eddy-resolving (1/12 °) Atlantic and global simulations with the HYbrid Coordinate Ocean Model (HYCOM) is used to help clarify some presently unresolved connections between volume transports of Nordic Seas Overflow Water at key locations in the northernmost North Atlantic Ocean. The model results yield about 4 Sv of Iceland Scotland Overflow Water (ISOW) flowing westward into the Irminger Sea, 2 Sv through gaps in the Reykjanes Ridge north of the Charlie-Gibbs Fracture Zone (CGFZ) and 2 Sv through the CGFZ. These results provide insights into the well-known inconsistency between the observed westward transport of ISOW through the CGFZ (2.4 Sv) and that in the western Irminger Sea, which is nearly 2 times higher. The model results also suggest that (a) some ISOW, along with an eastward contribution through the southern part of the CGFZ, flows southward along the eastern flank of the Mid-Atlantic Ridge in the West European Basin, (b) there exist two ISOW pathways from the CGFZ to the Irminger Sea, and (c) there is recirculation in overflow water south of Cape Farewell and in the Labrador Sea. Comparisons with the long-term moored instrument database in the Irminger Sea show that the model-based circulation is in reasonable agreement with observed volume transports of overflow water and that it gives approximately correct temperature and salinity characteristics. The portion of the simulated ISOW that flows through the CGFZ into the Irminger Sea is deeper and denser than observed.