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Observed and Modeled Pathways of the Iceland Scotland Overflow Water in the eastern North Atlantic

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The Iceland Scotland Overflow Water (ISOW), one of the major components of the lower limb of the Atlantic Meridional Overturning Circulation (AMOC), is formed in the Nordic Seas and enters the eastern North Atlantic subpolar gyre via the Iceland-Scotland sill. After entraining the ambient waters, the relatively homogeneous ISOW spreads southward into the North Atlantic. An understanding of the distribution and variability of the spreading pathways of the ISOW is fundamental to our understanding of AMOC structure and variability. Three major ISOW pathways have been identified in the eastern North Atlantic by previous studies: 1) across the Reykjanes Ridge via deep gaps, 2) through the Charlie Gibbs Fracture Zone, and 3) southward along the eastern flank of the Mid Atlantic Ridge (MAR). However, most of these studies were conducted using an Eulerian frame with limited observations, especially for the third pathway along the eastern flank of the MAR. In this work, we give a comprehensive description of ISOW pathways in the Eulerian and Lagrangian frames, quantify the relative importance of each pathway and examine the temporal variability of these pathways. Our study distinguishes itself from past studies by using both Eulerian (current meter data) and Lagrangian (eddy-resolving RAFOS float data) observations in combination with modeling output (1/12° FLAME) to describe ISOW spreading pathways and their variability.