



On the Nature of the Mesoscale Variability in Denmark Strait

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The dense overflow through Denmark Strait is the largest contributor to the lower limb of the Atlantic Meridional Overturning Circulation. As such, it is important to understand the sources of water feeding the overflow and how the water negotiates the sill as it passes into the Irminger Sea. Here we use a large collection of shipboard hydrographic transects occupied across the strait, together with 6-years of mooring data from the sill, to investigate the water masses and mesoscale variability of the overflow water. Two dominant types of mesoscale features were identified, referred to as a "bolus" and a "pulse". The former is a large lens of weakly stratified water corresponding to a slight increase in along-strait velocity. The latter is a thin layer with greater stratification and strongly enhanced along-strait flow. The boluses, which are often noted in the historical literature, are associated with cyclonic circulation, while pulses, which have not been previously identified, are associated with anti-cyclonic circulation. Both features result in increased transport of overflow water. It is argued that these fluctuations at the sill trigger energetic variability downstream in the Deep Western Boundary Current.