

Title: Two years of observations of warm core anticyclones in the Labrador Sea and their seasonal cycle in heat and salt stratification  
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## Abstract

Between 25 September 2007 and 28 September 2009 a heavily instrumented mooring was deployed in the Labrador Sea, offshore of the location where warm-core, anticyclonic Irminger Rings are formed. The two year time series offers insight into the vertical and horizontal structure of newly formed Irminger Rings and their heat and salt transport into the interior basin. Twelve Irminger Rings passed by the mooring in two years. Eleven of these had distinct properties, while one anticyclone likely passed the mooring twice. Eddy radii (8 to 35 km) were estimated using the dynamic height signal of the anticyclones (8 to 18 cm) together with the observed velocities. The anticyclones show a seasonal cycle in core properties (1.9 °C in temperature, 0.07 in salinity at mid-depth) that has not been described before. The temperature and salinity is highest in fall and lowest in spring. Cold, fresh caps, suggested to be an important source of freshwater to the Labrador Sea, were seen in spring but were almost non-existent in fall. The heat and freshwater contributions by the Irminger Rings show a large spread (4 to 67 MJ m<sup>-2</sup> and -0.3 to -2.9 cm respectively) for two reasons. First, the large range of radii leads to large differences in transported volume. Secondly, the seasonal cycle leads to changes in heat and salt content per unit volume. This implies that earlier estimates of heat and freshwater transport by eddies, based on observations of single eddies, may not be representative of their contribution in the restratification process.