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Two years of Irminger Ring observations offshore of the West Greenland Shelf

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Anti-cyclonic eddies, called Irminger Rings, shed from the boundary current along the west coast of Greenland, transport warm and saline Irminger Current water into the interior Labrador Sea. The transport of heat and salt by Irminger Rings into the relatively fresh and cold Labrador Sea is thought to be important in the restratification of the basin after convection. However, since there are few observations, recent estimates of the importance of Irminger Rings are mostly based on models. This study shows new data from a mooring deployed offshore of the west Greenland shelf near the local maximum of eddy kinetic energy associated with the shedding of Irminger Rings. The mooring was deployed between September 2007 and September 2009. It recorded the hydrographic properties and current velocities of the water column, thus obtaining a time series of passing Irminger Rings. During the 2 year mooring deployment 12 eddies fitting the description of an Irminger Ring were observed to pass the mooring location. The Irminger Ring core properties show a seasonal cycle in temperature and salinity with a range of about 2°C and 0.05 psu, with maxima observed in late fall. This results in larger heat and salt contribution estimates compared to observations in literature, which were either taken earlier in the year or further downstream sampling older modified Irminger Rings. Some inter-annual variability was also observed. Most of the 12 Irminger Rings described here were observed during the first year. The decrease in the number of observed eddies during the second year of deployment appears to be due to a change in boundary current strength, as determined from satellite altimetry and surveys of the AR7W section. The resulting change in the circulation pattern was evident in the current meter records at the mooring site. More information about the seasonal to inter-annual variability is needed to fully understand the exchange between the boundary current and the interior Labrador Sea. The small radii of the warm core anti-cyclones described in this study, between 5 and 20 km, severely limits the possibility to track these eddies in altimetry, thus showing the necessity of observations beneath the sea surface.