

## Dr. Amy Bower: Impact of Irminger Rings on Deep Convection in the Labrador Sea

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### Project Summary

Deep ocean convection is limited to a small number of isolated regions worldwide, including the Labrador Sea, but it has a profound impact on the ocean's thermohaline circulation and climate. While the convection process itself has been studied intensively over the last decade, the restratification of the water column after convection, which will directly impact convection during subsequent winters, is not as well-studied.

It has recently been suggested that the decay of coherent, long-lived, anticyclonic eddies shed from a surrounding warm boundary current are potentially important in restratifying convection regions. This idea is most developed in the Labrador Sea, where anticyclonic eddies containing a core of warm, salty water from the Irminger Current (a remnant of the Gulf Stream) have been observed.

The goal of the proposed research is to advance our understanding of the role of Irminger Rings in deep convection by collecting new information on their initial structure and on the evolution of their core properties as they propagate across the Labrador Sea.

To meet this goal, we plan to deploy one densely instrumented mooring in the northeastern Labrador Sea near, but offshore of the eddy formation site to document the full water column hydrographic and velocity structure of about 12 new rings where they detach from the boundary and enter the interior. The mooring will also serve as the "launch pad" for the automatic release of a profiling float each time an eddy sweeps by the mooring. Trapped within the eddies by the strong azimuthal velocities, the floats will track the eddy trajectories and measure changes in eddy core properties as they move from the formation site toward the convection region. When this research program is completed, we will have unprecedented information on the structure and heat and salt content of nascent Irminger Rings that have separated from the boundary, improved estimates of the heat and freshwater fluxes associated with rings, and new information on where and how their anomalous core properties are spread within the Labrador Sea.

### OceanInsight: Irminger Rings Project Overview

[Link](#) to OceanInsight Irminger Rings Project Overview

### Related Multimedia



Tracking Warm Eddies in the Labrador Sea  
*Animation by Jack Cook, Woods Hole Oceanographic Institution*

» [View Video \(Media Player\)](#)

### Related Links



» [Submerged Autonomous Launch Platforms](#)

"Intelligent" device decides when the time is right to send off data-

gathering floats

Lying in wait deep beneath the sea surface, the innovative instrument is designed to detect when a swirling ocean eddy passes by and then release a float into it. A new SALP was deployed for the first time in the Labrador Sea in September 2007.

*Oceanus, December 5, 2007.*



» [Most Recent Data](#)

Most recent float results posted at this site.



» [Photo album from Irminger Rings cruise](#)



» [Teaching Accessible Science](#)

Accessible Science: Perkins teacher speaks at national conference about collaboration between Perkins School for the Blind and Dr. Amy Bower.

### Manuscripts



[Two years of observations of warm core anticyclones in the Labrador Sea and their seasonal cycle in heat and salt stratification.](#)

de Jong, M.F., A.S. Bower, and H.H. Furey, 2014. *Journal of Physical Oceanography*, 44, 427-444, doi:10.1175/jpo-d-13-070.1.

[Eddy seeding in the Labrador Sea: A Submerged Autonomous Launch Platform application.](#)



Furey, H.H., M.F. de Jong, J. R. Valdes, and A.S. Bower, 2013. *Journal of Atmospheric and Oceanic Technology*, 30, 2611-2629, doi:10.1175/jtech-d-13-00069.1.

### Articles



Fieldwork - The Unseen Currents. On the Labrador Sea, the scientific crew of the research vessel Knorr hunts for underwater storms, sinks a two-mile mooring, and gathers clues to the planet's fate. *Popular Science*, March 2011.

## Posters



Furey, H.H., M.F. de Jong, and A.S. Bower. Eddy seeding in the Labrador Sea: A Submerged Autonomous Launch Platform application. Poster presented at Ocean Sciences Meeting 2014.



de Jong, M. Femke, Amy S. Bower, Heather H. Furey. Two years of observations of warm core anti-cyclones in the Labrador Sea. Poster presented at 2013 AMOC Conference.



Furey, H., A. Bower, and T. McKee. An Irminger Ring Mooring in the Labrador Sea, Preliminary Results. Ocean Sciences Meeting, 2010.



Bower, A. S., H. H. Furey, and T. McKee. An Irminger Ring Mooring in the Labrador Sea. Poster presented at the 2009 Spring EGU and AMOC Conferences: project overview and early results.

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