up against THE BARRIER

A Research Cruise to Greenland During Storm Season

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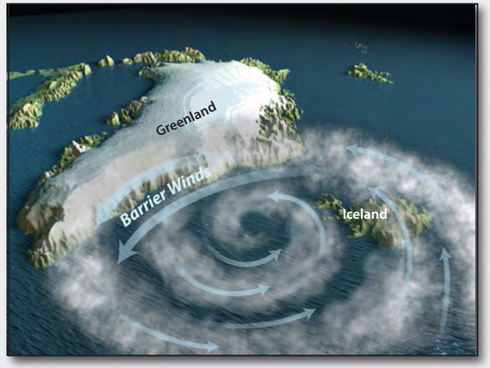
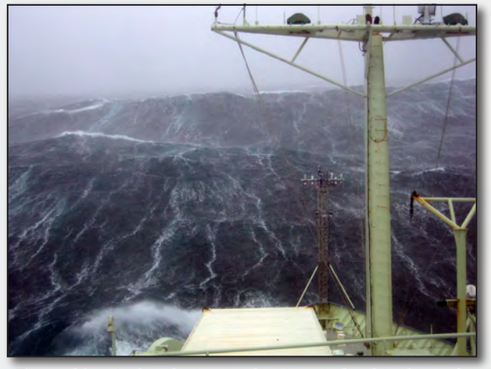
The region between Greenland and Iceland is one of the stormiest places in the world Ocean. The North Atlantic storm track carries intense low-pressure systems from the west into the area where they tend to stall. The associated high winds and loss of heat from the water to the atmosphere drive the ocean in important and complex ways. In October 2008 the research vessel Knorr ventured to this area to learn more about the air-sea interaction.



Often, when a storm nears the high coastal mountains of east Greenland, the winds are channeled southward along the "barrier" and accelerate. Very little is known about how these barrier winds impact the ocean. One of the primary aims of our project, sponsored by the National Science Foundation, was to collect measurements, both from the ship and from sub-surface moorings, to enhance our knowledge of this phenomenon.

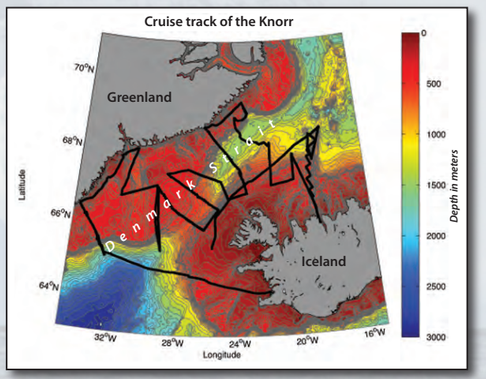


The problem is that the intense barrier winds whip the surface of the ocean into a frenzy making it extremely difficult to sample. One particularly vicious storm pounded the Knorr with winds that gusted to hurricane strength, resulting in extremely tall and angry waves. A second, stronger storm forced the ship to seek shelter for three days inside a north-Iceland fjord.

The primary mode of operation was lowering an instrument to the bottom to obtain vertical traces of temperature and salinity. Bottles mounted on the package captured water samples throughout the water column. This information, together with acoustically-derived velocity measurements taken from the hull of the ship, revealed a great deal about the ocean structure and movement in this region. Guiding the instrument package safely back on deck during high winds required great concentration and precise timing.

The presence of icebergs and pack-ice further complicated the study. The Knorr's crew kept a sharp lookout for the former (particularly during storms), while the latter forced the ship to divert its track partway through the cruise (the Knorr is not ice-strengthened).

The atmospheric measurements were made using "radiosondes," also known as weather balloons. On a calm day these were easy to deploy. When the barrier winds blew it was a different story – the balloons were sometimes distorted into unimaginable shapes and often popped. Luckily, a few successful deplyoments during storms provided valuable information about the upper-atmospheric structure of the barrier winds.



During the 30-day cruise, Knorr lowered instruments into the water more than 200 times, gaining important insights into the workings of the ocean in this harsh environment. The cruise track reveals the extent of the ocean area sampled despite the challenging weather. This is a vivid testimony to the ability of research vessels and the hard work of their crews in advancing our knowledge of the high-latitude ocean.

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