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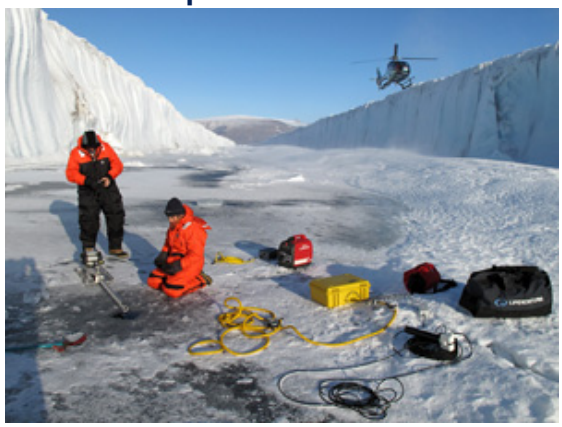
Straneo Research Group: Welcome to the Straneo Research Group

The high latitude oceans play a key role in our climate system. Large amounts of heat, carried poleward by warm ocean currents, are released to the atmosphere in these regions making them milder, more inhabitable and their ecosystems richer. The cooling of the ocean waters, in turn, results in the formation of dense waters which fill the bulk of the oceans and contribute to the global ocean circulation. Variations in the formation process have been linked to past, modern and future climate variability. The high latitude oceans also funnel large amounts of polar freshwater, from rivers and excess precipitation, equatorward as part of the global hydrologic cycle. Changes in freshwater in and out of the high latitudes have the potential to induce large changes in ocean circulation and climate due to the stabilizing impact of freshwater on the ocean's stratification. Finally, the high latitudes are where the ocean and the cryosphere (ice sheets, glaciers, sea ice) meet and interact with potentially dramatic consequences. For example, warming of ocean waters is one of the leading mechanisms used to explain the recent mass loss from both the Greenland and West Antarctic Ice Sheets.

My group studies high latitude oceanic processes and their role in the climate system. Our work has focused on the Arctic and North Atlantic Oceans and on their interaction with other components of the climate system with a special emphasis on the Greenland Ice Sheet. Specific areas of interest include the poleward flow and transformation of warm waters, the formation of dense waters in the convective regions of the North Atlantic, the export of freshwater from the Arctic, and the interaction of ocean waters with Greenland's outlet glaciers. Our methods include data collection from a range of coastal to open ocean vessels, helicopters and land stations, analysis of historical data, theory and process oriented modeling.

Group Mission Statement

We seek to improve our understanding of the high latitude oceans, ice, and atmosphere, and their interaction, by engaging in rigorous, fundamental research that is attentive to the needs of society. We use innovative methods to collect and analyze data from remote, challenging, and undersampled polar regions, and combine this with models and theory to unravel the inner workings of the climate system. We are driven by a scientific curiosity, a sense of wonder and awe for the natural world, and a commitment to document and understand the ongoing rapid climate change in the polar regions. By sharing our findings with other scientists, the general public, and policymakers, we seek to engage and inform people on the physical science of polar regions. We strongly believe that scientific understanding is necessary for sustainable and sound decision making. As a group, we aim to build an open, stimulating environment in which junior scientists can mature and find their own path forward.



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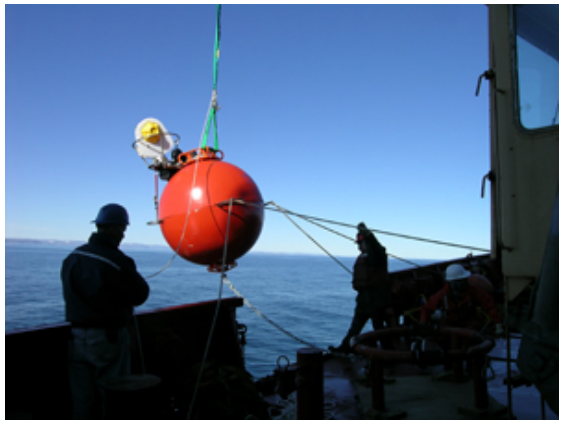
Several glaciers in northern Greenland have a large ice tongue (similar to Antartica's ice shelves) that floats over hundreds of meters of ocean waters. Here, we took advantage of a rift in the ice tongue of the 79 North Glacier, in NE Greenland, to sample ocean properties under the glacier. (August 2009) (Photo by E. Phillips)



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Excess precipitation and river discharge into the Arctic regions is exported to the lower latitudes in narrow boundary currents and through a series of straits. Variations in the amount of freshwater can impact climate on a range of scales. Here, we are deploying one of a series of moorings aimed at measuring the amount and timing of freshwater exported from Hudson Strait into the North Atlantic for several years. (Summer 2006). (Photo by F. Straneo)

Last updated: November 17, 2015

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