

Beaufort Gyre Exploration Project: Dispatch 18: Icy Work

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In many ways, the ice is very inconvenient for our work. Most people here are interested in the water properties. Of course the ice is what makes this ocean so different than the others, but it makes it very difficult to sample the water column. First you need a big ice breaker to get here (comfortable but very expensive), even then you can't always go where you want, and there often is the stubborn ice floe drifting towards the wire when your instrument is 3000 meters down...

But we need to understand the ice. The formation and melting of the ice are driving changes in the ocean temperature, salinity, and density. The ice also creates a boundary separating the water from the atmosphere, so that the heat from the sun and the momentum (motion) for the wind have to go through an additional step before being transferred to the water column. Jennifer Hutchings and her student Alice Orlich, of University of Alaska, are on board the *Louis* to study the ice. They record the characteristics of the ice along the ship track - every hour, on the dot, you can see them going up to the bridge, staring at the ice for a while, and scribbling some code on the log sheet. They have also been deploying tracking floats, which will be sending their position every 10 minutes for the next couple of years, providing a measurement of how the ice moves around in the Beaufort Gyre and, by having an array with 10-km spacing, its deformation (convergence and divergence).

Whenever they have the opportunity, Jenny and Alice go to the ice and directly measure thickness and freeboard (height of the top of the ice above water line) by drilling a small hole and lowering a locking measuring tape. They also collect ice sample and ice cores. Combining these direct observations with satellite measurements and numerical model help predict and understand the ice conditions, both in the present and in the future.



Every hour, Jenny and Alice walk up the the bridge and record the type of ice around the ship (here second-year ice) and its thickness - estimated from the ice chunks broken by the ship. The meter-long stick they installed (bottom center of this photo) help to gauge it.



Tim Kane and Jenny Hutchings are using a 2-inch auger to drill all the way through the ice...



... and then lower a measuring tape with a clever locking mechanism to measure the thickness of the ice. Here Helen Drost (IOS) is recording the numbers.



Jenny and Alice Orlich are also installing a series of ice tracking floats (yellow bucket), which are anchored in to the ice and sending their position every 2 hours, allowing Jen to track the drift of the ice.



As for the navigation, you always get a better perspective from up in the air. Jenny or Alice (seen here through the helicopter window) often go along Denis Lambert, the ice observer (left) in the ice recon missions.



Jenny in the helicopter, photographing and recording all the types of ice she observes.



When they have a chance, they actually go on the ice and collect samples - to be analyzed for nutrients, sediments, and plankton. Jenny and Kristina Brown (IOS) are looking an ice core.



This is the bottom of the core, showing what the underside of the ice looks like. You can hardly see it, but there are small channels through which the salt is rejected during ice formation (brine channels), and tiny zooplankton (red dots) live in there.

Photos by Luc Rainville

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