

## Beaufort Gyre Exploration Project: Dispatch 17: Another Ice-Based Observatory (77 N, 140 W)

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Helicopter Pilot Chris Swannell, Ice Observer Roger Provost, Rick Krishfield and John Kemp (WHOI) were searching for a large floe (with room enough for an IBO with multiple widely-spaced buoys) on their reconnaissance flight this morning. After about 45 minutes and about 10 miles away from the ship, Chris radioed the bridge to say they had found a floe and were going to land so Rick and John could drill some test holes. The floe was very near to the science station (station CB 15) where we had done a CTD/Rosette cast earlier this morning; it was about 200 m in diameter with many melt ponds, and surrounded on two sides by ridges. Just like yesterday's floe, this one was not one uniform piece of ice, but appeared to have rafted regions with the same water-filled cavities between two ice layers on top of the ocean.

Today's IBO consisted of an ITP, an Autonomous Ocean Flux Buoy (AOFB), an Ice Mass Balance (IMB) buoy, three temperature/salinity Ice Beacon buoys, and a surface-ocean temperature buoy (called the UpTempO buoy, Univ. Washington). The AOFB, a Naval Postgraduate School buoy, measures currents, temperature and salinity to obtain turbulent fluxes of heat, salt and momentum at the interface between the ice and ocean. Such measurements allow us to deduce the ocean's influence on the sea ice, including parameters of relevance to Arctic climate such as the fraction of fresh or salty water in the upper ocean that arises from ice melt or growth.

The floe for today's IBO needed to be large enough for our experiment designed to understand lateral variations in the upper ocean. For this experiment, we deployed three buoys to measure temperature and salinity in the ocean beneath sea ice in a triangle around the ITP, each about 100 m away from the ITP. In addition to the profiling unit with temperature/salinity/dissolved oxygen sensors, the ITP (ITP 54) has a stationary temperature and salinity sensor (a Sea Bird Microcat) immediately below the sea ice above the top sampling depth of the profiling unit. The spatial distribution of high-frequency measurements will allow us to assess how the physics of the ice-ocean interface vary over a small area.

It was a busy day on the ice with more electromagnetic ice surveys, drilling for thickness measurements and coring in addition to the multiple buoys. While work was underway on the floe, Helicopter Pilot Chris Swannell, Alice Orlich (UAF) and Linda White (IOS) deployed four International Arctic Research Center GPS drifters (in an approximately 10 km square centered around the floe) to monitor how the sea-ice pack deforms.

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