Beaufort Gyre Exploration Project: Dispatch 23: Ice-Based Observatory

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Today was Mega Buoy day, meaning that 4 buoys were deployed on one ice floe, creating an Ice-Based Observatory (IBO). The data collected b systems will give scientists a detailed picture over time of Arctic ice, water and weather dynamics. (And no one has to stay here over winter!)

David Meldrum of the Scottish Association for Marine Science (SAMS) deployed his SAMS- Ice Mass Balance Station (IMBS). David is trying to the flux of heat through the ice from both the sun and the water. His station has 3 systems to collect data. The first system measures the temper the ice, and the air just above and water just below. The second collects both incoming and outgoing solar radiation. Using two sets of sensors, pointing up and the other pointing down, he measures how much of the incoming radiation is reflecting back off the ice into the atmosphere.

Question: what is the name of the ratio of reflected to incoming solar radiation?

The third system collects general weather data: air temperature, wind speed, precipitation, air pressure and humidity. It is all powered by 2 batte charged by the wind and the sun! The data collected here will allow David to add to his model of ice dynamics. More information on his buoy sys be found here: www.sams.ac.uk

Mike Dempsey deployed an Ice Mass Balance Buoy (IMB buoy) for the US Army Cold Regions Research Engineering Lab in Dartmouth, NH.

On the right, David Meldrum is setting up the solar panels and the wind collector that will charge the batteries that power the SAMS-IMBS. Dave Griffith is working on the solar radiation measurement arm (sticking out to the right) and the weather station (on top).

Mike stands next to his completed work, the IMB Buoy. The system is white to minimize the heat-absorption of the equipment.

This system measures the accumulation of ice and snow from both above and below the ice floe. It has a string of thermistors that record the temperatures of the boundary layer*, the area where ice becomes water and water becomes ice. Understanding how quickly the ice melts in sun freezes in winter offers another measure of the Arctic climate and how it is changing.

WHOI deployed two buoys here. Another ITP was installed (see 3 August Journal entry and http://www.whoi.edu/itp/ for details on this ice based

They also put out an Autonomous Ocean Flux Buoy (AOFB) for the Naval Post-Graduate School. This system measures turbulence between the ocean boundary layer. These data offer a direct measurement of temperature, salinity and momentum* fluxes between the ice and water. Details buoy are here: www.oc.nps.navy.mil\~stanton\fluxbuoy

WHOI deployed an ITP as part of the IBO. Jim (left) and Will monitor the Arctic Winch as it pulls the line into the water under the ice.

WHOI deployed this AOFB system to measure changes in ocean currents under the ice. It is powered by a battery that is recharged with wind energy.

Kenny Scozzafava and Kristina Brown prepa samples for gas content analysis.

Ice and snow samples were also collected here, giving a more complete picture of this IBO. Putting all these data together, scientists can build a that incorporates past data, past cause-and-effect connections, and applies them to the future.

The fog started to roll in as the last helicopter trip left the IBO. The 4 deployed buoy systems are already collecting data. Picture by Rick Krishfield.

The ship is visible through the fog. The wake on the port bow is from the ship's bubbler system.

TERMS

Flux: The flow of something between layers. For example, the SAMS-IMBS is measuring the flux of heat from the sun through the ice into the wa and the flux of heat from the water to the ice above.

Boundary layer: the interface between two substances. For example, in the ice-water boundary layer under the ice and above the water, ice is m water is freezing.

Momentum = mass x velocity. For example, the AOFB is measuring the momentum that the ice and water gain and exchange from wind and cur

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