

Beaufort Gyre Exploration Project: Dispatch 11: See the Sea with the CTD

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If you've ever known any sea-going oceanographers, there's a good chance you've heard them talk about CTDs, rosettes, and Niskin bottles. These are core tools of the trade for investigating water properties.

The CTD is a package of sensors that measure Conductivity (to determine salinity), Temperature, and Depth. These are core physical properties of the water which determine the density of the water. Water will layer based on its density when it's in a stable state, like oil and vinegar. Water in the ocean acquires different temperature and salinity properties based on where that water 'formed' and the path that it's travelled since then. For instance, water that formed in the North Atlantic then moved up into the Canada basin is saltier than that which has moved in from the Pacific, and is found lower in the water column. In the Canada Basin, the seas are generally very calm thanks to the sea ice cover which limits mixing, and helps keep layers very distinct. There are many other sensors that we send down with the CTD to take measurements alongside it, such as an oxygen sensor, and a fluorometer to measure phytoplankton (such as algae). They all collect data continuously *in situ*, then send it up the cable to our computer at the surface so we can see these properties in real time

Niskins are bottles that are sent down with the CTD. We use them to sample water from the depths desired, then bring them up to the surface. They are sent down open, and then close when we give a signal on the way back up. We call this firing the Niskin. We use the live feed of data from the CTD on the way down to determine at what depth we want to fire the Niskins. When they're back on deck we can sample the water for whatever properties we want. Each of the 24 Niskins holds 10 litres of water. From this, we take 21 different types of samples used for investigating different chemical, physical and biological properties. Most are packaged up and sent home, but a few are analyzed while onboard.

The rosette is the term used for the entire package of CTD, Niskin bottles and frame. We have 2 teams of 5 that take care of deploying, recovering, and sampling the rosette: Day Watch (Kristina Brown, Edmand Fok, Dave Spear, Paul Dainard, and Michiyo Yamamoto-Kawai) is responsible from noon to midnight, and Night Watch (Sarah Zimmermann, Scott Rose, Sigrid Salo, Zoe Sandwith, and Yusuke Ogiwara) is responsible from midnight to noon. With the help of a crew member operating the winch, a typical cast in the Canada Basin will be to ~3500 metres, and will take 2 - 2.5 hours to get back on deck, then another 1.5 hours to sample.

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