

46°N to 75°N (Quebec City to the Beaufort Sea):
2011 Ocean Mapping Group Operations in the Canadian Arctic, Part IV

By Steven Brucker

Danar Guruh Pratomo and I arrived at the CCGS Amundsen on October 4th, 2011 at Kugluktuk, Nunavut. Leaving the ship were Christine Legere and Doug Cartwright. A journey of several days, with overnight stops in Edmonton and Yellowknife, preceded the final hop to the ship by helicopter. Tired but eager, we had little time to adjust as the ship left the community as soon as all the participants and cargo were aboard.

The first few days on the ship are often challenging. This was Danar's first trip aboard the ship; in fact, he hadn't set eyes on her before arriving in Kugluktuk. I was beginning my 6th trip aboard the Amundsen and immediately switched to the night shift. Adjustment to nights can be difficult and was especially so this time around. Fire drills and orientation tours, among other things, prevented me from getting a solid sleep for several days.

This leg of the journey was to begin in Kugluktuk and end just under a month later, at the Amundsen's home in Quebec City. Work aboard a ship in the Arctic can be challenging for several reasons, among the obvious ice, heavy seas, and mechanical limitations, is the ever changing schedule and logistical demands of a 40-scientist expedition. With unknown and rapidly changing ice conditions ahead, the uncertainty began immediately with a possible fuel exchange planned between the Amundsen and the CCGS Louis St. Laurent in Cambridge Bay.

The multibeam sonar system aboard the Amundsen is never turned off. We log data any time the ship moves through the water, and sometimes even when it's stationary. Due to this constant state of readiness, the GGE personnel manning the sonar can take advantage of small breaks in the schedule. The first of these opportunistic surveys occurred while we were in the vicinity of Cambridge Bay. The ship headed out to the shipping lane that winds through this portion of the Northwest Passage. Mapped sections are widened each successive year by transits through the passage. Dedicated mapping time, although hard to come by, is taken advantage of fully. As one can imagine, vast areas of the Arctic archipelago have never been mapped by a ship as fully equipped as the Amundsen. Each new snippet of data, whether it be water properties or current information, multibeam or seismic sonar can potentially be of use to someone with an interest in the area.

Once the work in Cambridge Bay was completed we were on our way east, then north, heading up to Viscount Melville Sound where several important scientific stations were planned. The ship stops at predetermined locations along the way to allow the scientists aboard to sample the air, water, and seabed for their research. These station stops can be between 1 and 24 hours long depending on the activities planned.

When the ship arrived at the northern entrance to M'Clintock Channel, it was determined that the station would be best started in the morning. This left the rest of the night for seabed mapping and a unique survey was done in this area which is rarely passed through and is often

clogged with sea ice. We had almost perfect weather and sea conditions for the survey and managed to collect a reasonable dataset.

Our next destination was to the west, in the heart of Viscount Melville Sound. A mooring had been placed at the station there the previous year, in a small opening in the sea ice. Uncertain ice conditions were present, with full coverage being shown on maps from the Canadian Ice Service. The helicopter was sent out to do reconnaissance and the finding was that the ice was fairly thin and the half-day journey into the ice pack could prove rewarding in terms of recovering the mooring.

Both heavy sea conditions and the presence of ice render the multibeam sonar's data nearly useless. The sub-bottom sonar fairs better and provided quality data for the next several days of work in the ice. One small bathymetric survey was completed at night as the ship, parked in the icepack, drifted with the current. One of the several scientists aboard who utilize the sonar system's data was pleased to hear that the glacial bedforms found in that area supported his research findings. This area is one of several in the operating area of the Amundsen that is almost always covered in ice.

Once the mooring was successfully recovered and the science work was done, the ship sailed west to Resolute and then on to Lancaster Sound where many science stations were completed. Activities included the mapping of a portion of an 8-km piece of the Petermann Ice Shelf and collection of sub-bottom and multibeam data in support of piston-coring operations by the Geological Survey of Canada.

When work in Lancaster Sound was completed the ship turned north again, heading to the northern end of Baffin Bay, between Ellesmere Island and Greenland. Heavy winds combined with loose ice packs created dangerous conditions and the possibility of ice pressure buildup. The ship turned south to stay clear and spent the next several days attempting to conduct the important scientific transect across the bay. Heavy seas and strong winds forced the Amundsen to seek shelter in Thule, Greenland, for a night. The lights of the U.S. Air Force base were visible as we pulled into the anchorage. The morning after arriving we headed back out to try again. Some scientific observations were completed but most of the transect had to be abandoned as the adverse conditions were forecast to continue and time was running out.

We sailed south through Baffin Bay towards the coast of Baffin Island. Most of the bay was frozen over by that point, so our first transit through that portion of the bay was completed without accompanying multibeam data. A team of scientists were aboard to map the underside of portions of the Petermann Ice Shelf. Our collaboration with them consisted of mapping the edge, and in some areas the submerged top, of the ice island. Our "portable" multibeam system, installed on the ship's barge, was utilized for the successful mapping of the ice island off of Clyde River, Nunavut.

With time running out, the ship sailed south through wind and freezing spray warnings towards the Labrador Sea. We detoured into Frobisher Bay on a search and rescue call that ended on a happy note. Our last "stop" was a bathymetric survey on the continental margin near northern Labrador. The survey was requested by geologists who are studying the area and how it

may have been affected by large events such as the draining of Lake Agassiz, an immense lake in the centre of North America that formed when the ice from the last ice age melted.

A snowy owl landed aboard the ship while off Hudson Strait. It looked out for us through some stormy seas as we approached Newfoundland and finally decided it was time to disembark once we passed Anticosti Island in the Gulf of St. Lawrence. It was here that we started packing up our gear and preparing it for a van ride back to Fredericton. The very large components of the ship's multibeam system stay aboard but everything else including our barge mounted multibeam system returns home with us each season. After we tied up in Quebec City on October 30, we quickly loaded the vans with our equipment and headed towards New Brunswick and its first snowstorm of the year.