

## Project ICEBERGS Newsletter #5

*Perspectives from the 'on-ice' team of the AUV team – Anna Crawford*

October 5, 2011

The ICEBERGS team is at it again, with a few new crew members and a target change as far as ice islands go. Sprits are high among the international team of Alexander Forrest (University of California Davis), Andrew Hamilton (University of British Columbia), Richard Yeo (AUV Consultants, Iceland) and Anna Crawford (Carleton University) as we start our three and a half week cruise from Kugluktuk (formerly Coppermine), Nunavut to Quebec City, Quebec. The first stage of the project in July - which had both Alex and Andrew aboard - culminated in an instrument installation on a small ice island, which the original team had christened *Berghaus*. A weather station, oceanic mooring measuring temperature and salinity near the iceberg and several ablation stakes were erected to derive an estimate of the rate of melt of the iceberg. Total ice thickness measurements were completed with ground penetrating radar. Unfortunately, in the short time period since this work – *Berghaus* has severely melted and fractured and most of the instrumentation was lost in late August. Needless to say, it is no longer a possible goal for our project to re-target *Berghaus* for re-measurement as was the original goal. However, ice islands Petermann Ice Island (PII)-Ba in Lancaster Sound, and PII-B grounded near Clyde River on Baffin Island are both possible locations for the team to direct its attention towards. These are smaller fragments stemming from the same source, the Petermann Glacier in northern Greenland, of the large ice island that recently made the news when it appeared off the coast of Newfoundland this summer.

The objective is to have the autonomous underwater vehicle (AUV) map the underside of the ice island and on-ice measurements of total thickness to be conducted. Ablation stakes will also be installed to gage surface melt while attached beacons will record the ice island's drift over the coming months. Together, this data from above and below the ice will improve the Canadian Ice Service's drift and deterioration models for icebergs, specifically the less commonly studied ice islands which are becoming increasingly frequent off of Canada's eastern coast.

We departed on the CCGS Amundsen yesterday afternoon and went straight to work readying *Gavia*, our Autonomous Underwater Vehicle (AUV) for action and setting up our laboratory space. Unlike the last Arctic tour in July, the AUV team got its first trial run a



Richard Yeo assembling the AUV.  
Photo courtesy of Anna Crawford.



Andrew Hamilton positioning the AUV for calibration outside of Cambridge Bay, NU.  
Photo courtesy of Anna Crawford.

day into the trip. On Wednesday afternoon (October 5) we took the barge out for equipment testing while the Amundsen was re-fuelling outside of Cambridge Bay, Nunavut. We emerged with a mixed bag of results – many positives and a few kinks to work out, but we are glad to have had the opportunity to test so early into the cruise. The barge took us all the way to land outside of the small town which made it possible for the team to calibrate the AUVs direction and position. This was not completed during the July testing and it is hoped that a calibrated compass will help for the upcoming missions.

With the calibration completed, we re-boarded the barge and set off towards the middle of the bay to get the AUV into the water for a solo operation. This was a perfect chance to check on the status of other equipment utilized in the ICEBERG project. We are glad to report that the satellite phones and *Gavia* are communicating clearly, our hydro phone is receiving well and our GPS tracksticks are indeed tracking. Unfortunately the AUV was not as cooperative on her first mission as she was unable to dive correctly. However, this is exactly the reason that Richard Yeo, our AUV specialist, is part of our team and he was speculating as to software and weight imbalances before we were even back on board the Amundsen.

Again, the team is feeling fortunate to have had the chance to work with the AUV at onset of the ship's tour. We were delivered the news that we would be able to deploy the barge again the next morning, a task that takes at least four crew members from the main ship. They are great to have aboard and are all keen to help and hopeful of our success.

Just that night however we had the good fortune to cross the gangplank to the CCGS Louis S St-Laurent, from which the Amundsen was taking fuel. The Louis S St-Laurent has on board an 7.5 meter, 1875 kg AUV (for comparison, *Gavia* is 2.85 meters, 75 kilograms). It is an incredible machine that would be stunning to see gliding across the ocean floor.



ICEBERGS team and CCG crew unloading *Gavia* for calibration. Photo courtesy of Richard Yeo.



The AUV on board CCGS Louis S St-Laurent. Photo courtesy of Anna Crawford.

It was all stations go the next morning (October 6). Day 2 at sea and the second test run of *Gavia* was to commence at 9:30 while the Amundsen was stopped at its first research station due west of Cambridge Bay. We debarked from the main ship on the barge through rolling seas and motored to our test site a few hundred meters away. With 300 grams of weight to help the AUV dive and some software alterations (including rpm adjustments), we were ready to give *Gavia* another shot at completing a mission. The first positive sign was that *Gavia* did indeed dive to her mission depth of 10 meters - even after a bit of trouble at the onset dealing with the large waves confusing her depth and pitch settings. The rolling seas and breaking whitecaps made detection of *Gavia* tough; however, the mission was a success! Richard quickly gave her a new track to complete and *Gavia* was off again. This 12 minute track was at a deeper depth (50 meters) and sent the AUV farther from the barge. It was quite the task to re-locate *Gavia* this time around, but after getting her safely on board, we are excited to report that she dove successfully to the 50 meter programmed depth. We hope to work out a kink with the CTD depth sensor – but with two days of testing under our belts and another trial session scheduled tomorrow, we are quickly able to adjust the AUV's settings. This allows us to prepare for the crucial operations next week where we will be sending *Gavia* under both water and ice!



Andrew Hamilton working with the hydrophone to locate the AUV.  
Photo courtesy of Anna Crawford.



The Amundsen stopped at Research Station #314 awaiting our arrival back from AUV testing. Photo courtesv of Anna Crawford.