

Project Cornerstone

Newsletter #6:

27 March, 2009 (Friday). (The last Newsletter should have been dated the 26th.)

Yesterday I mentioned that we didn't have a name for the vehicle, and, as a throw-away line, I said, "any suggestions?" Well – I received quite a few ideas. For your interest and amusement I include them (without their sources).

- Snoopy
- Yorca (as in Yellow Orca)
- "Ariadne", daughter of King Minos, who aided Theseus in overcoming the Minotaur.
- (And again...) How about Ariadne? Helped Theseus overcome the Minotaur and aren't sea vessels usually female, anyway? Also she's the goddess of weaving, and that has to be significant.
- Aglooka, The name the Inuit gave to Dr. Rae, [one of the great Arctic explorers]. Means 'he who takes long strides'.
- How about Aegeus or Poseidon, depending which legend you believe one of these was the father of Theseus.
- "Pytheus". While Theseus was a "legendary king of Athens", Pytheus (~325 BC) was a Greek navigator and explorer who sailed "so far northwards that he witnessed the arctic midnight sun and icebergs".

However, yesterday I wasn't thinking quite straight. The AUV we are using this year is only leased to us; the ones that the group will use next year are presently being built by ISE. They will be bigger, heavier and capable of going to a depth of 5000 m. They are the ones we want to name, and the important point for this naming exercise is that there will be two of them. So, we have to start thinking of names that go together naturally. Something like 'Castor and Pollux' or 'Romeo and Juliet' or the 'Two Ronnies'. I believe that 'Thing One and Thing Two' has already been taken. Any ideas?

And, on a related topic, I would like to express my appreciation for all the email I have been getting in response to the Newsletters. It's nice to know that so many people are following our adventures. I've responded to only a fraction of the emails, but I have good intentions, and, given a couple of 'weather days', I'll catch up.

There is a 'Thank God it's Friday' party going on right now, so this Newsletter may not get posted until tomorrow. But I'll start.

Today was another lovely day – clear, not-too cold (minus 30) and no wind. (See the smoke rising straight up over the Alert buildings at the end of our day.) At both camps the tests and experiments marched along without a hitch. We are either on – or ahead of – schedule, and all the principals seem quite happy. The new people are becoming more comfortable with the alien



environment. They are experimenting with ways of dressing to keep themselves warm on their skidoo journeys, and they are learning to ride the skidoos so that they don't shake themselves to pieces. The transit time to Garry's camp has been cut almost in half.

At the AUV camp the short version is that we lowered the vehicle below the bottom of the ice, and then pulled it off to the side. Once it was to the side of the hole we ballasted it light so that it rose up against the bottom of the ice sheet. The operators played with the pitch angle of the AUV as it rested up against the ice. They then ballasted it heavy and pulled it back to the ice hole and recovered it. Then we did it all again to see whether any problems would arise. Now in more detail...

In order to pull the vehicle off to the side of the ice hole it was necessary to string lines from the vehicle over to small holes drilled some distance from the tent. (See the hero picture taken after the hole was finished.) These little holes were about 15 m away from the AUV hole. At each four-inch hole they lowered a light rope (with a weight). A small Remotely Operated Vehicle (ROV) swam from the big hole over to the rope, grabbed it in its pincers and pulled it back to the large hole. This gave us a rope linking the little hole with the hole in the tent. One line was attached to the forward lifting point of the AUV, and the other was attached to the aft lifting point.



Darrell Mouland, Peter King and Alex Forrest after drilling a four-inch hole through the 6-ft-thick ice.

These two lines allowed us to pull the vehicle off to the side. Two more lines were tied to the same attachment points to allow us to pull the AUV back to the hole. It should be noted that at no time will the so-called 'Autonomous' vehicle ever be lowered without a couple of lines on it.

The small ROV that strung the lines deserves a paragraph or two of its own. We had intended on bringing up the Phantom, a much larger ROV that has a larger range and a much greater ability to push and pull. Its disadvantage is its size and weight (300 lbs). Unfortunately (and I don't know the details), it was not able to come, and it was replaced by a much smaller unit, a VideoRay. I am sure that ROV manufacturers don't like to hear their vehicles described with the word, 'cute', but it was. (See right.) I am sure the engineers would like to hear the words, 'light, agile, easily controlled, etc.', and it was all of those things, too.



VideoRay ROV. The boots give you the scale.

The operators were Dan Graham and Alex Forrest, who took turns getting experience. They (and the ROV) had no trouble finding the ice hole and the hanging weight. You will note in the 'hero' picture that a small area has been shovelled clear of snow. From under the ice this 'window' shows up like a beacon. The rest of the ice surface, which is covered with snow, looks dark. The ROV simply looks around for a bright spot and swims towards it.



Alex Forrest operating the ROV.

One other thing that the ROV has to do is attach a line to a ring (e.g., an attachment point on the AUV). It does this with something called a Happy Hooker, and it needs to be able to push reasonably hard to make this work. There is some concern that it might not be beefy enough to do this, but we didn't have time to run a test. I expect we'll have the results for the next Newsletter, and I am sure that we will have a description and a picture of a Happy Hooker.

I had some concerns with the four-inch holes. It was cold out there today, and I was worried that the holes would freeze over before all the testing was done. You have to realize that you can't ream out the ice hole with an auger once there is a rope through the hole. Thus, if the ice ever freezes solidly to the rope, we would be in trouble. So, we tried to keep the surface of the hole open by pouring pots of hot water into it. We would scoop a pot of salt water out of the big hole and put it on the heating stove. Once the water was good and hot we would pour it down one of the holes. (See right.) We also covered the hole with a piece of styrofoam in an attempt to insulate it. Then we would heat more water.



Chris Kaminski keeping an ice hole open with hot water.

The method worked surprisingly well, and I relaxed. Of course we pulled the ropes out at the end of the day.

The picture on the right is a picture of the ROV screen. You are seeing what the ROV camera sees. In this case the ROV is looking upwards toward the AUV.



At the other camp Garry seems happy with his progress. Since they have to come in for every meal, a lot of the day is lost in travel time. On Monday we will started getting box lunches, and that should substantially improve the day's output.

Garry and Don Mosher took a little trip off to the west of their camp. They were able to travel on a smooth refrozen lead even though the ice all around them was quite rough. The water deepened appreciably, 243 metres being their deepest measurement.

One of the modems Garry puts into the water will simulate the AUV. The idea is to see how well this modem can determine its position by 'talking' to the eight that he has installed around the camp. He is pleased that he can now test this procedure (and mathematical algorithms) at a range of at least 4 km.

At some point during the writing of this thing, Friday turned into Saturday. Today will be a day for recharging the AUV batteries and for repairing skidoos and other equipment.

(Richard Pederson provided most of the pictures.)

Best Wishes, Ron Verrall
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