



**NOAA Teacher at Sea  
Lisa Hjelm  
Onboard NOAA Ship RAINIER  
July 28 – August 15, 2008**

**NOAA Teacher at Sea: Lisa Hjelm, Crossroads Academy, Lyme, NH 03768**  
NOAA Ship RAINIER  
Mission: Hydrographic Survey  
Geographical area of cruise: Pavlof Islands, Alaska  
Date: August 11 & 12, 2008

**Science and Technology Log 6: Looking Ahead**

*The weather started getting rough, the tiny ships were tossed. If not for the courage of the fearless crews the data could be lost.*

We're into our last two work days before *Rainier* begins the transit back to Homer, AK. The weather has indeed changed. The skies are shifting, shades of gray, and this afternoon the winds may kick up to 15 knots. Spits of rain hit your face when you venture on deck. It could be a rough day on the launches. A few people picked up seasickness medication on the way to the morning meeting on the fantail. After fifteen days of work the faces of the crew of the *Rainier* are taking on determined, tired looks. These are the final days of the 2008 season in the Pavlof Island area.

Even with an end in sight no one is gearing down. There is still plenty to do. The crew is preparing the ship for an upcoming inspection and an open house during "Hydrapalooza", a gathering of hydrographers in Homer, AK. The officers are preparing for the 36-hour return transit. The survey technicians are putting finishing touches on their final survey sheets and reports for this area. There is activity and some excitement everywhere. Perhaps due to the extended period of fine weather, work is ahead of schedule. Today, the launches are surveying a new sheet that wasn't scheduled until 2009. They've named this one SNOW: white uncharted territory.

After three days working evenings on Night Processing, I am still learning the procedure. There are many steps involved in processing the sonar data. I was fortunate to have the opportunity to work on SNOW data. It was exciting to be the first person to see the bathymetry of uncharted seafloor. It is amazing to think that only 1% of the world's oceans have been mapped. The future for aspiring hydrographers looks bright. And that brings me to the topic of my final Teacher at Sea Science log: what's in store for the future. Talking with the crew, observing and listening to stories, two projects that people on the *Rainier* are or will be involved with captured my interest: *Okeanos Explorer* and Autonomous Underwater Vehicles, (AUVs).

In 2008, NOAA will commission an ocean exploration ship, *Okeanos Explorer*. It's currently in Seattle, WA which is, coincidentally, the homeport of the *Rainier*. *Rainier*'s Chief Steward suggested that I read about the *Okeanos Explorer* because it has an interesting educational

mission. That seemed like a great idea, and I discovered that the Chief Boatswain from the *Rainier* will be moving to the *Okeanos Explorer* when it is deployed. So, I looked it up at, “*Okeanos Explorer: A New Paradigm for Exploration*” (<http://www.oceanexplorer.noaa.gov/explorations/07blacksea/welcome.html>), where I found the following information. The *Okeanos Explorer* will be dedicated to exploring the world’s oceans with a threefold mission: deep water mapping; science class remotely operated vehicle (ROV) operations; and real-time ship to shore transmission of data. Scientists, educators, students and the Chief Boatswain from the *Rainier* will be participants in ocean exploration in much the same way that I was part of project SNOW (see above)



**Chief Boatswain outlining the day’s work to crewmember**

Through ship personnel there is also a connection between NOAA Ship *Rainier* and



***Okeanos Explorer*, image courtesy of NOAA Office of Ocean Exploration**

Autonomous Underwater Vehicles (AUVs). Recently, I talked with a visiting Survey Technician who was programming as he spoke. The keyboard seemed an extension of his fingers. His regular job in Silver Spring, MD turned out to be in research for developing and improving AUVs. AUVs are unmanned, underwater robots that can use their sensors to detect underwater mines, objects of archaeological interest or for mapping the seafloor. This was fascinating to me, and I asked many questions.

Last summer, 2007, I had followed the day-by- day log of the

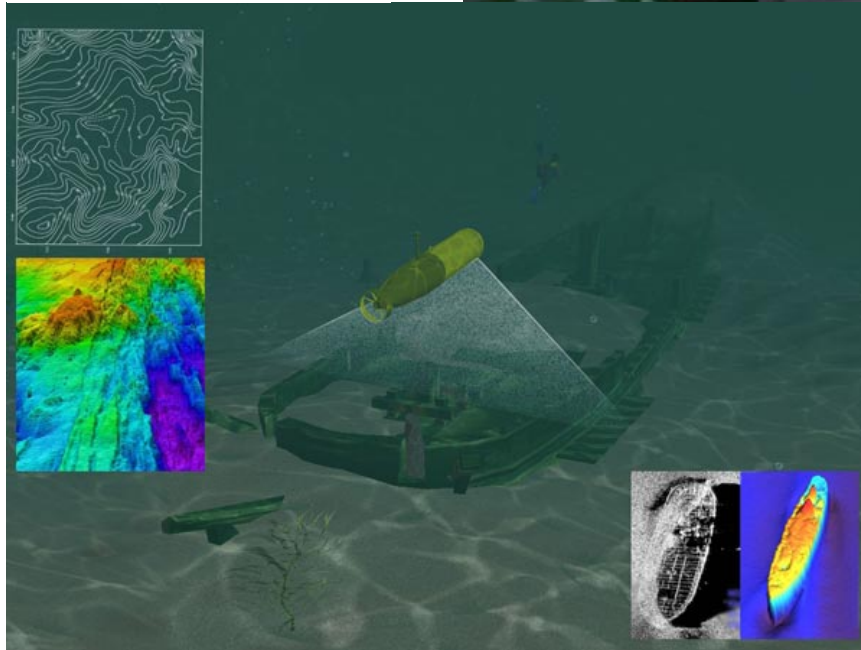
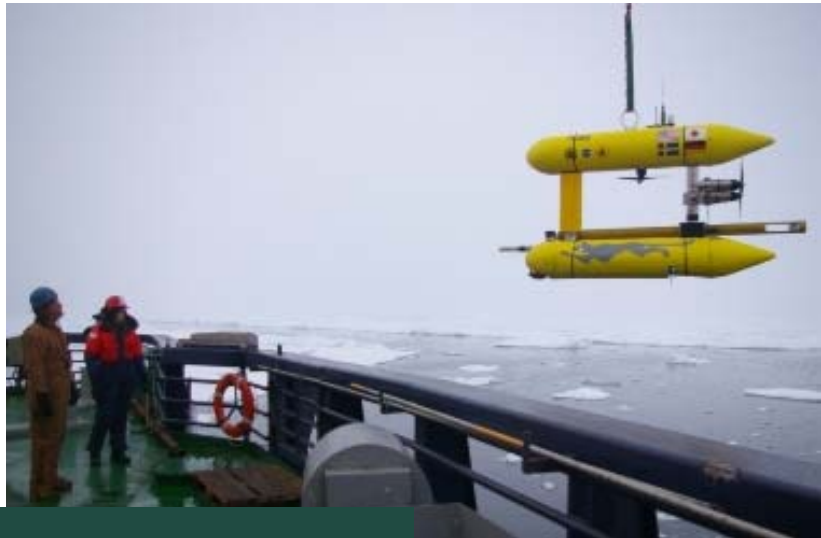
Icebreaker *Odin* in the eastern Arctic Ocean (<http://polardiscovery.who.edu/expedition2/index.html>). On this expedition two AUVs, named *PUMA* and *Jaguar*, were used to explore and map below the ice on the Gakkel Ridge. In part their mission was to search for hydrothermal plumes or vents. AUVs and their potential are probably as interesting to ocean explorers as the Mars Rover is to NASA scientists. I found out more about NOAA’s role in exploration with AUVs at “AUVfest 2008: Navy Mine-Hunting Robots help NOAA Explore Sunken History”

(<http://www.oceanexplorer.noaa.gov/explorations/08auvfest/welcome.html>).

Right: AUV PUMA

([http://blogs.spectrum.ieee.org/automaton/chris\\_l&r2.jpg](http://blogs.spectrum.ieee.org/automaton/chris_l&r2.jpg))

Below: An AUV demonstrates its ability to sense and respond to its surroundings. Image courtesy of AUVfest 2008: Partnership Runs Deep, Navy/NOAA, [OceanExplorer.noaa.gov](http://OceanExplorer.noaa.gov)



### Personal Log 6: Back on the Bridge, Headed Home

As we transit from the survey area to Homer, AK, I have time to reflect on what I will take away from this experience. Again, I am pleasantly interrupted by trips to the Bridge to look at whale spouts and the endless display of volcanic mountains, islands and sea. We've made a stop en route for the anglers aboard, and I periodically race back to the fantail for

photos of fish, and fishermen and women. But, my thoughts keep returning to, how to make an experience like this real for students. I believe that a research experience and interaction with scientists can make an impression on a student that will last a lifetime. I want students to ask questions and be able to find the resources to answer them. On this voyage I have learned how scientists map the seafloor, and like NOAA I am interested in finding even more ways to use the data.

The Hydrography branch of NOAA recognizes that seafloor maps are a valuable resource that can have multiple uses in addition to producing nautical charts for safe surface navigation. They are looking for ways to, Map It Once: Use Many Times. I had in mind something catchier like, Hydrographic Survey: Ocean Window, but the thought is the same. I like the idea of something called Hydrographic Survey Highlights. Students could see seafloor discoveries or mysteries

from the most recent surveys, and then use NOAA resources to discover what they are or what seafloor features they represent. A good example would be the images of the volcanic plume surveyed by the *Fairweather* in Dutch Harbor, AK this summer. Another question I have had while surveying the seafloor around Pavlof Volcano is, “Is it glacial, or is it volcanic?” Perhaps I will use one of those topics for a lesson plan when I get back.

I want to close my Teacher at Sea logs by saying that I have had the time of my life, and am willing to come back again if the *Rainier* ever needs me.

Here are some resources for looking at hydrographic survey data:

- NOAA Nautical Chart On-Line Viewer, <http://ocsddata.ncd.noaa.gov/OnLineViewer/>
- Hydrographic Survey Priorities, <http://www.nauticalcharts.noaa.gov/> (NOAA's Office of Coast Survey)
- National Geophysical Data Center, <http://www.ngdc.noaa.gov/> (NOAA's National Geodetic Data Center)

