



**NOAA Teacher at Sea  
Christine Hedge  
Onboard USCGC *Healy*  
August 7 – September 16, 2009**

**NOAA Teacher at Sea: Christine Hedge**

Ship: U.S. Coast Guard Cutter *Healy*

Mission: U.S.-Canada 2009 Arctic Seafloor Continental Shelf Survey

Geographical Location: Beaufort Sea, north of the Arctic Circle

Date: September 3, 2009

**Weather Data from the Bridge**

Latitude: 78<sup>0</sup> 34'N

Longitude: 136<sup>0</sup> 59'W

Temperature: 29<sup>0</sup>F

**Science and Technology Log**

***Low-Impact Exploring***

Some of my previous logs have talked about sound in the Arctic Ocean. Sounds made by seals, whales, ice cracking and ridges forming, bubbles popping, wind, waves – these are the normal or ambient noises that have always occurred. As governments, scientists, and corporations explore the Arctic their presence will have an impact. Ships breaking ice and the seismic instruments they use to explore, add noise to the environment. We call this man-made noise, anthropogenic noise. Will these additional sounds impact the organisms that live here? Can we explore in a way that minimizes our impact on the environment? The marine wildlife of the Arctic has evolved in an ocean covered by ice. But the ice is changing and the human presence is increasing. Studies of other oceans have shown that more ship traffic means more background noise. In most regions of the Pacific Ocean the background noise has increased 3 decibels every 10 years since the 1960's. The scientists on the *Healy* and the *Louis* are interested in minimizing their impact as they explore the Arctic Ocean.



**Ethan Roth shows me the inner workings of a sonobuoy.**

### ***Do No Harm – Step 1 Collect Data***

One of the ways we are listening to the noise that our own instruments make is with sonobuoys. These are devices that help us listen to how sound propagates through the ocean. While the



**I am tossing the sonobuoy off the fantail of the *Healy*.**

*Louis* is using airguns to collect seismic data – scientists on the *Healy* are throwing sonobuoys into the ocean to listen to the sound waves created by the airguns. Knowing how the sound waves from airguns travel through the water will help us to understand their impact on the environment.

Sonobuoys are self-contained floating units. They consist of a salt-water battery that activates when it hits the water, a bag that inflates with CO<sub>2</sub> on impact, a 400-foot cable with an amplifier and hydrophone (underwater microphone). The data acquired through the sonobuoy are relayed to the ship via radio link. A receiving antenna had to be placed high up on the *Louis* in order to collect this data. Like many of the devices we are using to collect

information, the sonobuoys are single use instruments and we do not pick them up after their batteries run out. After 8 hours of data collection, the float bag burns and the instrument sinks to the bottom. They are known as self-scuttling (self-destructing) instruments.

The more we know about the sounds we make and how these sounds are interacting with the animals that call the Arctic home, the better we will be at low impact exploring.

### **Personal Log**

I've had lots of questions from students about the weather. For most of our trip, the air temperature has been around 27<sup>0</sup>F and the visibility has been poor. A log fog has prevented us from seeing the horizon. We have also had quite a few days with snow and freezing rain. Some of our snow flurries have coated the decks with enough snow to make a few snowballs and prompted the crew to get out the salt to melt the slippery spots.



**The float inflates as the sonobuoy floats away.**



**An Arctic snowball**

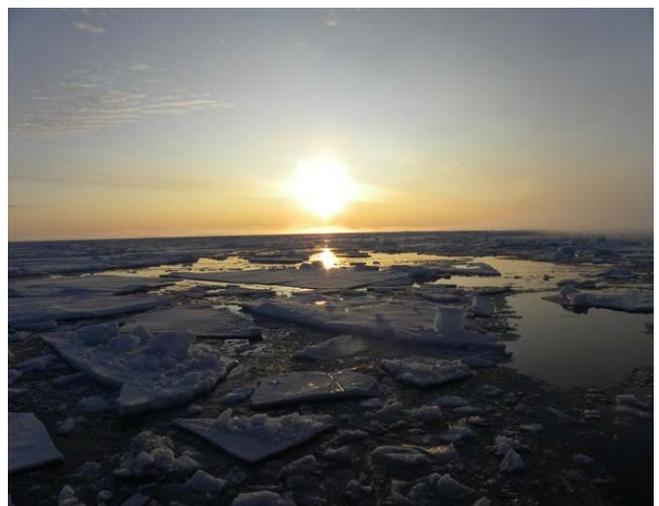


**Ice crystals on a valve**

This past week we had some seriously cold days. On September 1<sup>st</sup>, the air temperature was 16<sup>o</sup>F with a wind chill of -25<sup>o</sup>F. These cold days brought blue skies, sparkling snow, and beautiful crystals forming on the handrails, ropes and many other surfaces on the deck.

**FOR MY STUDENTS: Why do you think it is foggier on warmer days?**

As we travel south we are starting to get some sunsets and sunrises. There are a few hours of twilight between the times that the sun dips below the horizon – but no true night sky. One of the things I miss the most is seeing stars. I look forward to seeing the Indiana night sky in a few weeks. But until then, the gorgeous sun over the Arctic will have to do.



**As the seasons change and we travel south, the sun gets lower in the sky.**