NOAA Teacher at Sea
Kimberly Wolke
Onboard NOAA ship RAINIER
July 24-August 11, 2006

Mission: Hydrographic Surveys of the Shumagin Islands, Alaska
Day: Sunday, July 30, 2006

Weather from the bridge at 1800:
Skies: Partly Cloudy (PC)
Visibility: 10 nautical miles (nm)
Wind Direction: West (W)
Wind Speed: 27 knots
Waves: 1-2 feet
Sea Water Temp.: 9.4°C
Sea Level Pressure: 1015.3 millibars (mb)
Temp. (°C): 12.8 (air temperature)

TAS Kim Wolke driving a survey boat with Able-Bodied Seaman Jodie Edmond looking on.

Science and Technology Log
Today I went out on my first survey boat. After finishing up some survey work in the Porpoise Harbor area, we were supposed to join another boat on the other side of the island at a place called East Cape Wedge to run some lines. Before we could get there, the other boat was calling back to the ship regarding the weather conditions. They had winds of about 20-25 knots with swells of 4-5 feet in the water…not very favorable for driving a survey boat in. They decided to err on the side of caution and headed back to the ship before the conditions worsened. It's amazing how we can be in such close proximity to one another but separated by some land and have different weather conditions.

A CTD, which gets lowered into the water prior to beginning surveys to get a reading on the speed of sound through the water.

The boat I was on was completing some of the survey lines called holidays. A holiday can occur for many reasons when lines are run. Basically there was a gap in the data that was acquired by another boat, therefore, those sections of lines needed to be revisited to acquire the data in order to get a complete model of the sea floor.

Before we could begin collecting data today, we needed to do a CTD cast. This was done on the ship earlier in the cruise when we were doing surveying from the ship as well. The cast data supplies the given speed of sound through water in a particular location. This information

gets input into the program used to process the sonar data so that it can be adjusted for the speed of sound of the water being surveyed.

The multi-beam sonar, which is mounted on the underside of the boat, has what is called a transducer on it. The transducer converts electrical energy into sound and emits the sound waves through the water. These sound waves will eventually hit an object (ie: a rock or the sea floor) and reflect back up to be recovered by the transducer. The transducer will measure the angle at which the sound returned, the time it took for the sound to be received, and the intensity of the return. Each transmission received back appears as a dot on the computer monitor. Where a solid object likely exists the dots are clustered together and can give a visual model of what the sounds waves hit.

The POS MV aboard one of the NOAA ship RAINIER survey boats.

Like in all science, there are possibilities for biases in the data collected. In this case, there are several reasons for such biases. First, not all of the sound waves are reflected perfectly. Some of the sound waves are absorbed by the surfaces of objects. Second, sound waves may reflect at an angle that the transducer cannot pick up. Third, some sound waves may ricochet off of a few surfaces before making it back to the transducer, therefore, it gives an inaccurate reading how far the wave traveled, its intensity, etc. Another reason for biases is that the boat may be pitching, heaving, or rolling too much to get good data, which is one of the reasons one of the survey boats returned early today.

It's impossible to eliminate all of the biases, however, there are measures incorporated into the data collection to minimize them. One of the ways some of the biases are accounted for is the use of a system called POS MV. There are sensors in the unit which record the movement of the boat and correct for these movements and their effect on the data. The POS MV also measures the vessel's position with Differential Geographic Positioning System (DGPS) receivers, accurate to approximately 3 meters! NOAA requires accuracy to within +/- 5m. A regular GPS is only accurate to within 10m. When you're talking about making a chart of the ocean, it's rather important to be more accurate with your location. Once all of the data is collected other technicians back on the ship process it. Processing the data helps in "cleaning it" to eliminate "noise", therefore making the image a truer and cleaner representation of the sea floor.

Personal Log

I had a chance to drive the survey boat today. I really enjoyed that. The driver is called the coxswain. There's a small monitor mounted by the steering wheel, which shows you a chart of the area you're in with an overlay of the survey lines. It's the coxswain's job to

navigate the boat as straight as possible along each of the lines at a certain speed. It looks a lot easier than it really is. ENS Olivia Hauser displayed a few lines for me to practice on. I suppose if the water had been calmer and flat and there had been no wind it would've been easier. With winds of 15-20 knots and two-foot waves, it made it challenging to get the boat exactly on the line. I did improve the more I practiced. ☺

Kim Wolke
Teacher at Sea