NOAA Teacher at Sea
Jacquelyn Hams
Onboard NOAA Ship RAINIER
July 22-August 11 2006

August 6, 2006

Science and Technology Log

1200
Weather: Cloudy
Visibility: 10 nm
Wind direction: Light
Wind speed: AIRS
Sea Wave height: /.
Swell Waves direction: 350
Swell height: 0-1
Seawater temperature: 10.0 degrees C
Sea level pressure: 1018.5 mb
Temperature dry bulb: 15.0 degrees C
Temperature wet bulb: 12.2 degrees C

TAS Jacquelyn Hams uses a lead line to determine depth during a shoreline survey

Today I go out on a small boat with Jim Jacobson, Chief Survey Technician, ENS

Megan McGovern, RAINIER Junior Officer, Erin Campbell, Survey Technician, and Corey Muzzy, Seaman Surveyor and Coxswain to conduct a shoreline survey in Porpoise Harbor.

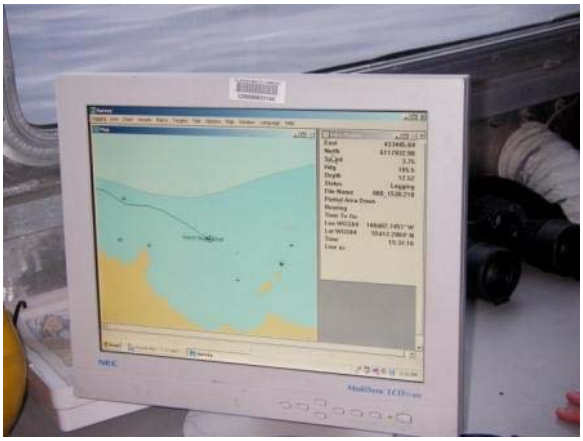
The objective of the shoreline survey is to verify some points which were identified by LIDAR (Airborne laser mapping) which may or may not be rocks along the shoreline. LIDAR is an emerging remote sensing technology that integrates the following three subsystems in to a single instrument mounted in a small airplane to rapidly produce accurate maps of the terrain beneath the flight path of the aircraft.

- LIDAR (LIght Detection And Ranging) is similar to radar or sonar in that it transmits laser pulses to a target and records the time it takes for the pulse to return to the sensor receiver
- Fixed reference systems
- Global positioning satellite system (GPS).

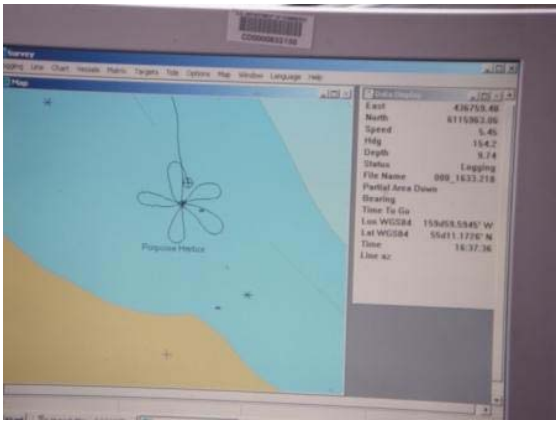
LIDAR utilizes a pulsed laser rangefinder mounted in the aircraft. While most LIDAR systems are designed to measure land elevations ("topographic LIDAR"), the technology can also measure water depths if designed with a light wavelength which will pass

through water ("bathymetric LIDAR"). Bathymetric LIDAR accurately measures the travel time for both the laser return from the sea surface and the return from the seabed. If the speed of light is known and one corrects for angle, scattering, absorption at the water surface and other biases, the distance to the sea surface and seabed can be computed from these times. The difference between these distances is the water depth. In general, bathymetric LIDAR is less accurate and lower resolution than the multibeam sonar systems on RAINIER's launches, but it can be much faster and safer in some areas.

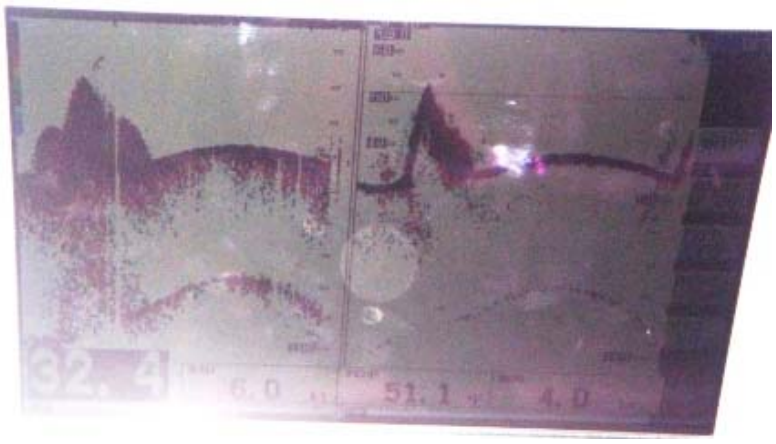
We have several LIDAR points to verify. RAINIER has been asked to investigate these points because they are around kelp which LIDAR cannot penetrate. The boat is equipped with vertical beam echo sounders so that the bottom depth is known. Once the boat reaches the point of investigation, the coxswain drives a star pattern around the point to make sure that all sides of the potential obstacle have been covered. Lead lines are used to confirm depths close to the shoreline.



Bathymetric chart reflecting points for investigation during shoreline survey



Corey Muzzy, Seaman Surveyor and Coxswain, drove a perfect star pattern around the area covered during boat reconnaissance



This is a picture of a sonar image taken on the boat during shoreline survey. The spike on the image represents a rock.

The presence of a rock is indicated by the peak in the sonar image on the left. Depth of the recorder is 32.4 feet.

We are able to survey all but three of our points until we have engine problems after crossing on the edge of a thick patch of kelp. Unfortunately, the engine will not start and we have to call for a tow.

Pictured above are ENS Megan McGovern, RAINIER Junior Office and Leslie Abramson, Able Seaman. Leslie Abramson is on the tow vessel that brings us back to the ship.

On the way back to the ship, I have yet another photo opportunity for some geology pictures. Nagai Island lies within a major fault zone of the Aleutian Islands so many of the rocks are folded and uplifted into spectacular structures. The beds pictured in the photograph below were deposited according to the Principle of Original Horizontality; therefore they should be stacked on top of each other in a horizontal position. Look at them now!

Imagine the stress that tilted these beds to the current position.