



**NOAA Teacher at Sea  
Gary Ledbetter  
Onboard NOAA Ship RAINIER  
July 7 – 25, 2008**

**NOAA Teacher at Sea: Gary Ledbetter**, Peninsula College, Clallam Bay Correction Center,  
Clallam Bay, Washington

NOAA Ship RAINIER

Geographical Area: Pavlof Islands in the southeastern panhandle of  
Alaska

Mission: Hydrographic surveys of Pavlof Islands area

Date: Tuesday, July 8, 2008

**Weather Data from the Bridge**

Winds SE/E @ 10 knots

Drizzle, Seas 1-3 feet

Temperature: High 45 degree F.

**Background**

The Office of Coast Survey (OCS) is a part of the National Oceanic and Atmospheric Administration (NOAA) that conducts hydrographic surveys. In short, they measure the depth and bottom configuration of bodies of water using sonar technology. From these measurements our nation's nautical charts are developed to assist in safe navigation of the United States waters. Additionally the surveys also locate and publish sea-floor materials that may inhibit safe ocean travel such as pipeline and cables, shipwrecks, and other obstructions.

NOAA hydrographic surveys have also been instrumental in locating the wreckage of TWA Flight 800, John F. Kennedy Jr.'s plane, and EgyptAir flight 990. OCS has conducted over 10,600 surveys since it began in the early 1900s. \*

**Science & Technology Log**

If you are like me, you probably thought that sonar was simply aimed at the bottom of the ocean and a graph-like image came back.



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**ENS Junior Officer Christy Schultz preparing to lower the CTD Recorder, which sits in the metal cage in front of her**

Well, this is essentially true – but there is a lot more to it than that. Prior to even using that technology, another research tool must be used: The CTD recorder. “CTD” means, Conductivity-Temperature-Depth recorder. This instrument measures either directly or indirectly such factors as temperature, saline, and density.

Although measuring these characteristics are not new (Benjamin Franklin did some of these measurements as far back as the 18<sup>th</sup> century), the methods of taking these measurements have drastically changed. The present technology was developed in the 1960’s where the instrument itself is placed in the water it is measuring. The instrument then takes a continuous measurement of conductivity, temperature and depth, which are recorded continuously. These measurements are taken up to 24 times per second. That kind of speed creates a very high-resolution description of the water being tested.

When the instrument is measuring conductivity, it is simply discovering how easily electricity passes through the water sample being tested. Since electricity passes through water more easily with a higher salt content; the more easily electricity is passed, the higher the salt content.

The CTD normally uses a thermistor: a platinum thermometer, or a combination of these to measure temperature. The accuracy is quite amazing: greater than 0.005 degrees Celsius.

Last, but not least, the CTD measures pressure. This pressure is measured in decibars. Depth and pressure are directly related. In other words, if you are at 340 meters below the surface, the meter will indicate about 350 decibars (dbars).

Once all these measurements are taken, they can either be stored in the actual instrument or they can be transferred to a computer when the CTD is withdrawn from the ocean.

OK, you may say, this is all well and good, but what does it have to do with mapping the ocean floor (the technicians call this, “mowing the ocean”)? The simple answer: All these conditions affect the speed of sound. Therefore when the sonar “pings” the computer will compensate for variables (temperature, density and salinity); this creates a more accurate reading of the ocean depth at any particular spot. \*\*

### **Personal Log**

I am discovering that hydrographic surveys are both simplistic, and complex. Simplistic in terms that the survey boats simply follow a pre-established grid and collect computerized data. They collect this data by following a pre-determined grid much like someone mowing their lawn. In fact the surveyors call it “mowing the ocean”. However, the interpreting of this data is the job of several engineers and engineer technicians which may take several hours or possibly all night.

\*Information obtained from NOAA website

\*\* Information obtained from the CTD website