NOAA Teacher at Sea
Diana L. Griffiths
Onboard UNOLS Ship ROGER REVELLE
June 22 – 30, 2005

NOAA Teacher at Sea: Diana L. Griffiths
UNOLS Ship ROGER REVELLE
Mission: Recovery of WHOTS-2 mooring and deployment of WHOTS-3 mooring
Day 1: Thursday, June 22, 2002,
Time: 2000

Weather Data from Bridge
Visibility: 10 miles to < 25 miles
Wind direction: 080°
Wind speed: 12 knots
Sea wave height: small
Swell wave height: 2-4 feet
Sea level pressure: 1016 millibars
Cloud cover: 5
Cloud type: cumulus, stratocumulus

The Cruise Mission
The overall mission of this cruise is to replace a mooring anchored north of the Hawaiian island of Oahu. The mooring consists of a buoy that contains numerous meteorological sensors that collect data on relative humidity, barometric pressure, wind speed and direction, precipitation, short and long wave solar radiation, and sea surface temperature. The buoy serves as a weather station at sea, one of few such stations in the world.

WHOTS –3 buoy during transfer from 2nd to 1st deck.

There are two of each type of sensor on the WHOTS-3 buoy to ensure that data collection will continue should a sensor break down. The buoy is equipped with a GPS unit. The buoy also serves as a platform for observing the ocean. Hanging below the buoy are four different types of instruments. These include SeaCATs, MicroCATs, an ADCP and NGVM.

The SeaCATs and MicroCATs take salinity and temperature measurements. The MicroCATs, in addition to salinity and temperature, also take

pressure readings. There are several of each instrument attached to the mooring and they are located approximately 5 meters apart down to a depth of 155 meters. (The WHOTS-2 mooring only contains MicroCATs). The ADCP or Acoustic Doppler Current Profiler is an instrument that allows the scientists to measure the velocity of the current at a set of specific depths. The NGVM is a New Generation Vector Measuring device that measures the velocity of the current at fixed points using propeller sensors located at 90° to one another. Finally, two Acoustic Release Devices are attached to the anchor that is holding the mooring in place. These instruments allow the scientists to determine the location of the anchor and will also mechanically release the mooring from the anchor when sent a specific acoustic signal. (More about how these work in a later log). The WHOTS-2 mooring has been sitting in the ocean for a year collecting data. It is powered by 4000 D-cell batteries and is capable of running off of them for about 16 months. I asked Jason Smith, the lead instrument calibration technician, why solar panels weren't used on the buoy and he told me that they are susceptible to being shot at or stolen. Evidently anything that looks valuable in the middle of the ocean is vulnerable to theft!

SeaCATs being prepared for mooring.

Personal and Science Log

After arriving in Hawaii on the afternoon of Monday, June 19th, it feels good to be at sea on a moving vessel. I spent the remainder of Monday meeting the science crew from WHOI (Woods Hole Oceanographic Institution) led by the Chief Scientist, Dr. Robert Weller, having a nice dinner and falling asleep after a long day of travel.

Tuesday brought my first view of the REVELLE, a working science vessel owned by the SCRIPPS Institution of Oceanography in La Jola California. (See

R/V REVELLE's resident technician, Cambria Colt, operating the crane used to move the WHOTS-3 buoy to the main deck of the ship.

http://shipsked.ucesd.edu/ships/revelle/index.html for diagrams, pictures and statistics describing this ship). The ship has two platforms below the main deck and three decks above, not including the bridge. The main deck contains heavy equipment consisting of several winches, a crane, an electric winding cart and other machinery designed to move heavy objects. All of this equipment operation is run or overseen by Cambria Colt, the resident technician, who knows the ship like the back of her hand. It is her primary job to act as a liaison between the ships' crew and the scientists, making sure that the needs of the science team are met.

We were at the ship by 7:30 a.m. and the team started working, preparing for the cruise. Many of the team members had already been here for a week unloading and working with the instruments. The team works well together – everyone keeps busy and seems to know what to do without a lot of discussion. I helped Jason to string up two GPS units on an upper deck of the stern of the ship as well as an antenna.

GPS units set up by science team on stern of R/V REVELLE.

The antenna is used to transmit all of the data from the mooring and from the ship to a satellite, which then directs it to WHOI. I also recorded measurements as Sean Whelan, the buoy technician, measured the distances from the top of the buoy to all of the instruments located on the buoy. He also wrapped bird wire repellant along the top of the tower of the buoy in an attempt to keep birds from landing on the instruments. The bird wire is spiky wire that jets out in various directions and can be quite treacherous to work with! Along the deck, Jeff Lord, an engineering technician, and Scott Burman, an undergraduate volunteer, worked on bolting down numerous winches to the deck that will be used to pull the buoy out of the water. Several winches are used on all sides to maintain maximum control over whatever is being maneuvered into or out of the water.

I also met the captain of the ship, Tom Desjardins, in the afternoon. I had no idea he was the captain when I first saw him, he was working hard on deck with the rest of the crew, clad in a T-shirt and shorts. He is quite affable, calm, and willing to put in a hand where it is needed. In a quick discussion with him I learned that security has become much tighter on the ship since 9 –11. There are always two people on watch at the entrance to the ship when it is in port making sure that everyone who enters and leaves is accounted for. We all wear badges when we are on ship when it is in port. I also asked him about potable water use on the ship. The ship can hold 12,000 gallons of water and up to 3,000

gallons more can be distilled per day. Heat from the ship's engines is used to distill the water.

I had Wednesday free to do a bit of sightseeing and that leads me back to today. We packed our clothes onto the ship early this morning and made up our berths (beds). The staterooms (bedrooms) are larger than I had expected. I have my own room and share a head (bathroom) with Terry Smith, another member of the team. Terry is also an undergraduate who won the NOAA Hollings Scholarship to participate on this cruise. Currently working towards a second career, Terry was a chef for 20 years before making the plunge to study science. She is working towards a degree in geo-oceanography. During the day I was able to get a computer set up and mostly watched and asked a few questions as more work was being done. The ship left port at 4:00 p.m. After taking a few pictures and watching the beauty of the coast slip away, I went back inside to attend a meeting led by Cambria and Dr. Weller.

Life Aboard Ship

Cambria talked about safety and reviewed some basics about living on the ship. We wear closed toed shoes at all times (except in our rooms), preferably steel-toed. When we are working on deck during the scientific operations we will wear hard hats and safety vests. Tomorrow there will be a safety drill at some point to be sure we all know where to "muster" and how to proceed should a fire or other problem occur on the ship. We separate our trash here – anything plastic and non-biodegradable has a separate bin. All of the paper and food waste, etc, has its own bin and is eventually tossed into the sea. Meals are at specific times during the day (and they are quite good!) but we are asked to "eat and run", as the galley crew needs to get on with their work of cleaning up and preparing for the next meal or just getting some time off. The ship is equipped with a laundry and an exercise room. Evidently on long cruises members of the crew can be seen running laps around the main deck.

Vocabulary – Weather Data

Wind direction:	Wind direction is measured in degrees, which follow the readings on a compass.
Wind speed:	Measured in knots. A knot is 1 nm/hr. A nautical mile is the distance required to travel 1° longitude. It is equivalent to 1.85 km.
Sea wave height:	This is the height of waves produced by the wind. This is logged in the ships log as either small or slight. The technical formula for sea wave height is .026 x (speed of wind)^2.
Swell wave height:	This is the height of the swells produced by distant weather patterns. Swells form a wave pattern as opposed to sea waves, which are more random. Swell wave height is measured in feet.

Sea level pressure:	Sea level pressure is the atmospheric pressure measured in millibars.
Cloud cover:	Cloud cover ranges on a scale from 0 to 8. The sky is divided into 8 quadrants and observed. There are notes kept in the ships log as to the type of clouds forming the cloud cover.