NOAA Teacher at Sea
Brett Hoyt
Onboard NOAA Ship RONALD H. BROWN
October 8 – October 28, 2006

NOAA Teacher at Sea: Brett Hoyt
NOAA Ship RONALD H. BROWN
Mission: Recovery of Stratus 6 mooring and deployment of Stratus 7 mooring
Recovery of SHOA tsunami warning buoy and deploy a fresh replacement buoy
Day: (Lucky) Friday, October 13, 2006

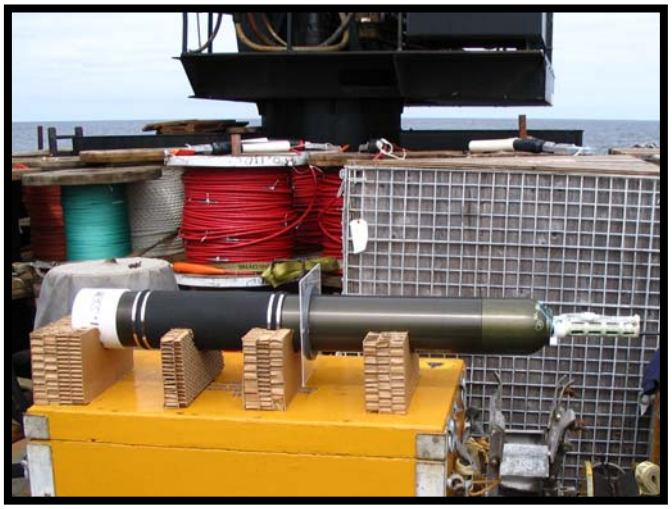
Weather Data from Bridge
Visibility: 12nm (nautical miles)
Wind direction: 160º True
Wind speed: 7 knots
Sea wave height: 0-1ft
Swell wave height: 5-7 ft
Sea level pressure: 1015.1 millibars
Sea temperature: 20.7ºC or 69.2ºF
Air temperature: 21.0ºC or 69.8ºF
Cloud type: cumulus, stratocumulus

The Scientists
We will not highlight a scientist today, as the star of our show is the floats and drifters.

This is a Sea Surface Drifter. The students of Burlington Elementary School in Billings Mt adopted this drifter. It was deployed off the coast of Chile

The Machine
Today we will examine the Argo Floats and drifters. The two machines do basically the same measurements but in different layers of the ocean. The drifters that we are deploying during the Stratus 7 cruise measure sea surface temperature (SST) and transmit that temperature and their location as they drift with the upper ocean currents. This tells scientist how warm or cold the water is and how the currents in the ocean move about. The reason scientists use drifters is that even though satellites are fairly good at acquiring sea surface temperatures some, at present, cannot penetrate cloud cover and all need the drifter data to improve their accuracy. By using the hundreds of drifters scattered throughout the globe, scientist can use this data to improve the current computer models of global climate condition and get real time data to use in their work.

Argo floats lead an active life traveling very little compared to surface drifters. The reason for this is that floats spend most of their time in extremely deep and very slow moving ocean waters. Some deep ocean water takes thousands of years to make their cycles through the oceans systems. These floats descend to about 1,500m to 2,000m (approximately 4,500ft to 6,000ft) and every 10 days a bladder inflates and it rises to the surface taking measurements along the way; at the surface it transmits its data back to the scientists thousands of miles away. These floats are built to last about 4 years.



This is an Argo float. It will spend most of its life in the very deep ocean (up to 6,000ft deep) and come to the surface every 10days to send off its data. It is approximately 4 ½ft to 5 ft long and weighs about 30 lbs.

The Experiment

No experiment with the drifters and floats.

Here Mr. Hoyt and Jeff Lord are examining a drifter before deployment. This drifter was adopted by the Burlington Elementary Research Team (B.E.R.T.). We all wish BERT a pleasant journey as he travels the Pacific Ocean.

This is the drogue chute that is deployed in the water beneath the drifter to stabilize its deployment with the ocean currents.

Classroom Activities

ElememtaryK-6:
Since measuring environmental temperatures is one of the primary functions of the drifters and floaters, lead the students in a discussion of: What is hot? What is cold? What can we use to measure temperature? Do students have a temperature?

Middle school:
The thousands of drifters are used to get real time readings of sea surface temperatures worldwide. Start by asking the students what is the temperature of our classroom. After they give you the answer ask them if it is that temperature everywhere in the classroom. Have them devise a way to check their theory. Why is it the same/different around different parts of the room?
Hint: This hint is for the classroom teacher and will be found at the bottom of this posting.
High School:
-Have the students go to the Datastreme Oceans web site to explore some of the cool findings available to the public.
http://www.ametsoc.org/amsedu/DS-Ocean/home.html
-They may also want to try the Middle school activity.

Thought Experiment provided by Dr. Weller:

How does an Argo float rise to the surface and later sink to a desired depth?

Middle School hint:
Have the students set about 20 cups or glasses, filled with water, in various locations around the room. Be sure the containers are covered to reduce cooling due to evaporation. Let the water stabilize overnight. The next day have the students take temperature readings at the different "sites". Compare the different readings around the room. Are they all the same or are they different. Lead the students in a discussion on the reasons for their results. Can they make any predictions about tomorrow's readings? Do the readings change over the weekend? (Most schools turn down the heat on the weekend). Have each class post their findings so that other "scientists" from other classes can be compared with their own. Maybe 1st period is different from 7th period.

High School Hint:
The ocean is stratified--the seawater is denser the deeper you go. This is because it is colder and sometimes saltier at depth. The density of the float depends on the ratio mass/volume. The float has a reservoir of oil inside that is pumped into or taken back from an external inflatable rubber bladder. Filling or emptying the bladder changes the volume of the float while its mass remains the same, so the float can change its density, allowing it to become buoyant enough to float to the surface or to adjust itself to match the density of seawater at 1,500m.