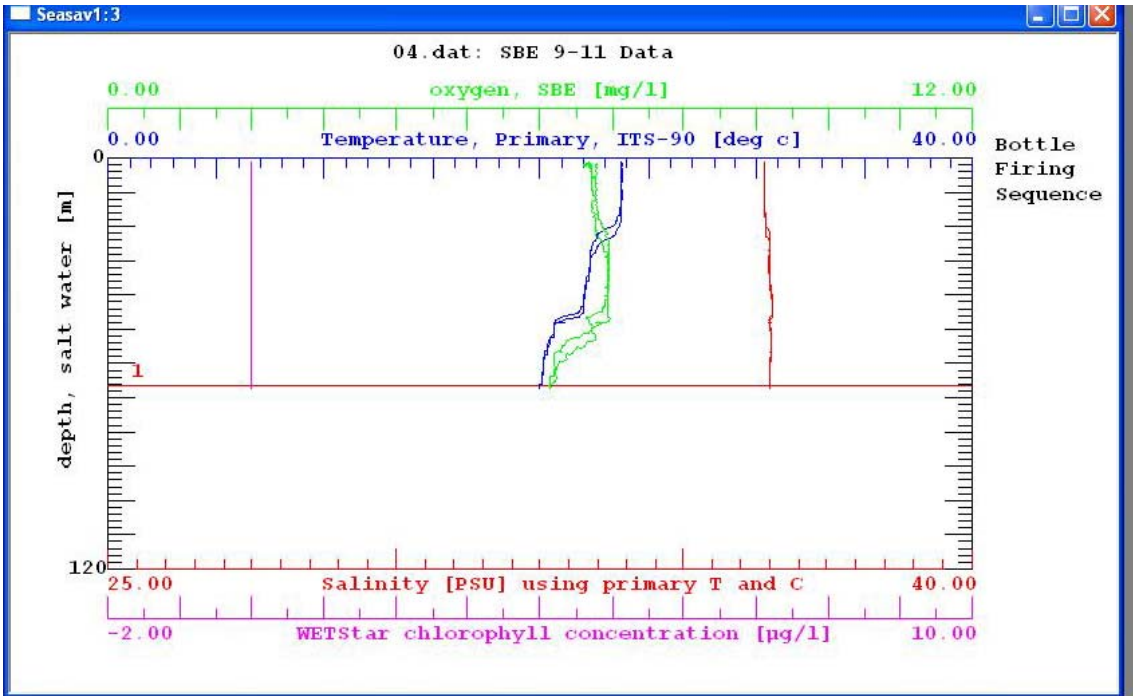
NOAA Teacher at Sea
Robert Lovely
Onboard NOAA Ship GORDON GUNTER
March 31 – April 12, 2008

NOAA Teacher at Sea: Robert Lovely
NOAA Ship: GORDON GUNTER
Mission: Document Fish/Coral Associations at Pulley Ridge and the West Florida Shelf
Date: April 4, 2008
Geographical area of cruise: Pulley Ridge in the Gulf of Mexico

Weather Data from the Bridge
Visibility: 12 miles
Wind Direction: 150° (SE)
Wind Speed: 18 knots
Sea Wave Height: 2-3 foot
Swell Wave Height: 1-2 foot
Seawater Temp: 24.4 degrees C.
Present Weather: Clear

Science and Technology Log
We begin and end each day by making a CTD profile of the water column at our sampling site. CTD refers to conductivity, temperature, and depth, but other parameters, such as dissolved oxygen (DO), also may be measured. Conductivity is an expression of salinity, which at our location on Pulley Ridge is pretty uniform throughout the water column. As we see from the graph below, however, both DO and water temperature do vary with depth. Temperature is uniform in the top layer of water and then begins to drop steadily with increasing depth from about 20 meters down. This portion of the water column, where temperature declines rapidly with depth, is called the thermocline. The temperature profile on our graph shows that a subtle thermocline extends nearly to the bottom at Pulley Ridge. This may help explain why certain shallow-water organisms are able to survive in this relatively deep water. In other locations the same depth may be well below the thermocline and therefore in water too cold for shallow-water species to live.

A "rosette" is used to hold the instrumentation for the CTD. Here we see the rosette being lowered down into the water column by way of a crane mounted on the GORDON GUNTER.



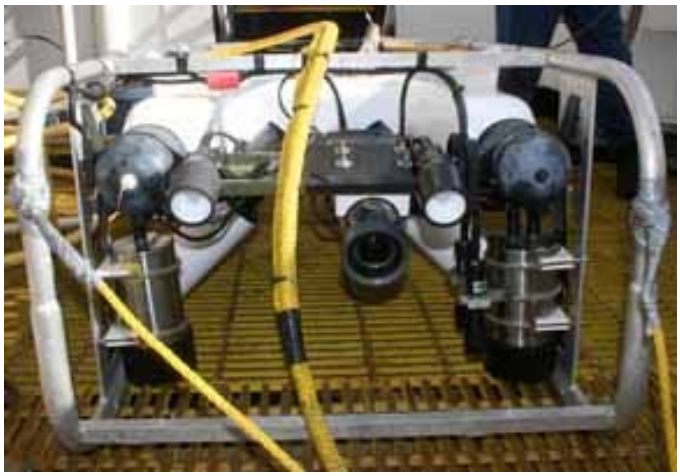
Above is a graph of the CTD profiles generated at Pulley Ridge on April 4, 2008. Software linked to the CTD instrumentation on the rosette generates salinity, temperature, depth and oxygen profiles of the water column. Note that the double lines on the graph result from the roundtrip made by the rosette down to the bottom and back.

Dissolved oxygen is normally high at the surface due to the mixing effect of wave action. But oxygen concentrations can be high in the deeper thermocline as well simply because cold water can hold more oxygen than warm water. Our graph above illustrates this relationship by exhibiting an increase in dissolved oxygen concentrations at depths between 20-45 meters.

Marine scientists employ different types of underwater vehicles to collect data on deep coral reefs, and the different vehicle types may seem a bit confusing at first. Three important underwater vehicles are Submersibles, AUVs, and ROVs. ***Submersibles*** typically refer to human-occupied vehicles, where a pilot climbs inside and drives the vehicle around like a small submarine. The most famous example is *Alvin*, a submarine operated by the Woods Hole Oceanographic Institution. ***AUVs***, in contrast, are *A*utonomous *U*nderwater *V*ehicles that are programmed to perform specific functions, such as bathymetric mapping. AUVs are robotic—they are completely independent, having no wires to the surface. Finally, ***ROVs*** are *R*emotely *O*perated *V*ehicles, which are tethered to the ship by means of a cable and umbilical. The ROV captures video and still images, and is driven by a pilot from a control room onboard the ship. While utilizing bathymetric charts created during earlier cruises, our mission on Pulley Ridge and the West Florida Shelf employs only the ROV.

Today we made three video transects (dives) with the ROV, each lasting about two hours. Each dive followed a predetermined course, as we began working our way north along Pulley Ridge. The depth of our dives normally ranged between 200-230 feet, with the ROV gliding about three

feet above the reef. The ship towed the ROV at speeds that typically ranged from .5 to 1.3 knots. However, because of the slack in the tether, the ROV itself had a remarkable range of speeds. In fact, skilled pilots can bring the ROV to a dead stop (while the ship continues to move) in order to pause for nice steady close-up shots of bottom organisms. I was very impressed by this flexibility of motion and the freedom it offered the pilot to search around the reef for organisms hiding in nooks and crannies.



This remotely operated vehicle (ROV) carries both a video camera and a still camera. The yellow umbilical shown in the foreground supplies power and control signals from the GORDON GUNTER.

Personal Log

I was given the opportunity to take the helm of the ROV during one of our video transects. I found this experience to be fun and somewhat akin to playing a video game. However, I also found driving the ROV to be much more difficult than it looks. It gave me a greater appreciation for the skill of our veteran pilots, Lance Horn and Glenn Taylor.

Rob finds out that it's interesting, but difficult, driving the ROV.