



**NOAA Teacher at Sea**  
**Eric Heltzel**  
**Onboard NOAA Ship RONALD H. BROWN**  
**September 26 – October 22, 2005**

**Log 16**

**NOAA Teacher at Sea:** Eric Heltzel  
NOAA Ship RONALD H. BROWN  
Mission: Stratus 6  
Tuesday, October 18, 2005

**Weather Data from Bridge, 07:00**

Temperature: 18 degrees C  
Sea level Atmospheric pressure: 1017 mb  
Relative Humidity: 71%  
Clouds cover: 8/8, stratocumulus  
Visibility: 12 nm  
Wind direction: 130 degrees  
Wind speed: 25kts.  
Wave height: 7 – 9'  
Swell wave height: 12 - 14'  
Swell direction: 130 degrees  
Seawater Temperature: 18 degrees C  
Salinity: 35.07 parts per thousand  
Ocean depth: 4371 meters

**Science and Technology Log**

Rodrigo Castro and Carolina Cisternas are research technicians from the University of Concepcion in Concepcion, Chile. They joined the cruise at Panama City and have been taking ocean water samples every 60 nm. Their samples are run through 0.7 and 0.2 micron filters. They capture and freeze particulate organic matter by this process and take it back to the lab at the university. The samples are analyzed for the presence of stable isotopes of carbon and nitrogen. These samples are then used as biomarkers to help determine the circulation of ocean water. A second analysis will be going on to locate the gene associated with nitrogen-fixing organisms. This is new ground for the scientists at the university.

Upwellings are areas where deep ocean water comes to the surface. According to Rodrigo and Carolina there are four significant areas of upwelling along the Chilean coast. The two most northerly are found at 20 degrees south and 24 degrees south. These are active year round and are slow and steady with no significant seasonal fluctuation. Another at 30 degrees south is moderate in nature with some seasonal variation, being more active during the summer. The most southerly is at 36 degrees south and is strong September to April. However it mostly disappears the rest of the year. Upwelling zones are recognizable because of their cooler water temperature. They

also have increased nutrients that are brought up from the deep and a higher amount of chlorophyll due to increased photosynthetic activity. Some fish species are found in greater abundance in these zones due to increased nutrients extending into more food availability.

### **Personal Log**

The RONALD H. BROWN is under way. We are steaming in an easterly heading on the leg of the cruise that will take us to Arica, Chile. It is a bit of a challenge for me, as we are no longer headed into the direction of the swells; instead, we are crossing them at a 30-degree angle, which makes for more oscillations in the movement of the ship. My tummy is being challenged.