

Log 19 Tuesday

. 202100Z September 2005

2. Position: Lat: 0-30.0N LONG 129-55.3W

3. Course: On station

4. Speed: 0 kts

5. Distance: 142.9 NM

6. Steaming Time: 12H 48M

7. Station Time: 11H 12M

8. Fuel: 3507 gals

9. Sky: Ptly Cldy: Ci, Ac, Cu, Sc

10. Wind: 120-T, 12 kts

11. Sea: 120-T, 2-3 ft

12. Swell: 120-T, 4-6 ft

13. Barometer: 1013.0 mb

14. Temperature: Air: 26.5 C, Sea: 24.7 C

15. Equipment Status: No change.

16. Comments: On station #19.

MASTER, R/V ROGER REVELLE

We did a broadcast to San Marcos Middle School this morning. Dr. Nelson was able to narrate a CTD cast for the students and talk about how the water is collected in the bottles and why it is necessary to use a CTD instead of a net tow for the samples they want. He talked about being able to sample at different depths and to accurately record the temperature and salinity at each sample depth as well as being able to sample the water for trace metals, Si and N.



Dr. Landry showed the students the Flow Cytometer and described how it worked and what they used it for as well as the methods for filtering the phytoplankton and the zooplankton.



This is the filtering system I work with in the mornings in Dr. Landry's lab to filter the phytoplankton for testing



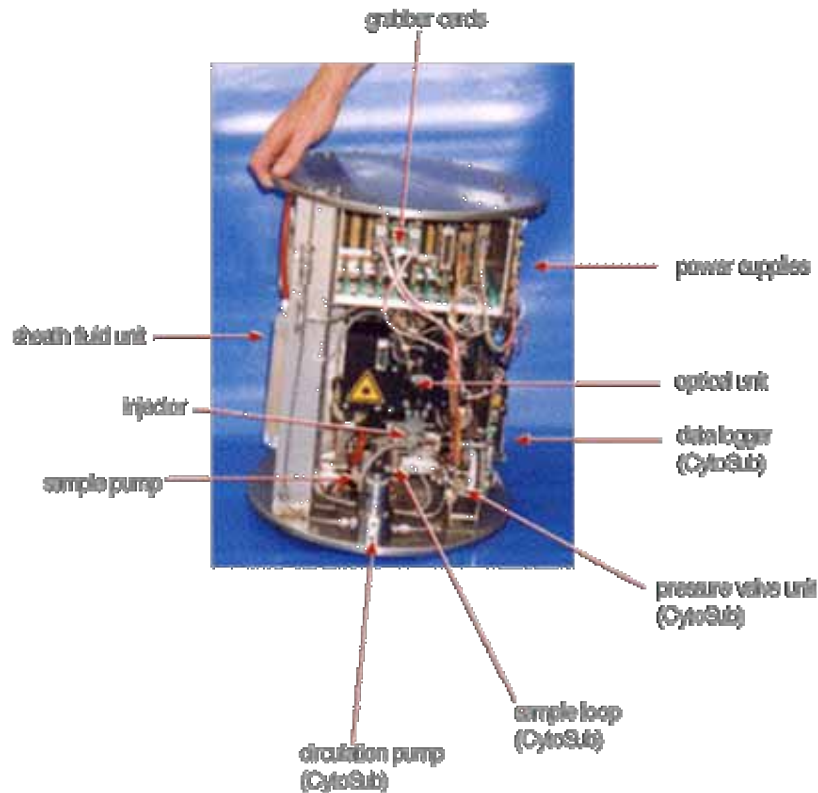
Looking at the broadcast image on the computer screen. When Dr. Nelson narrated the cast we were able to watch from the lab on the computer screen.



CTD cast on deck.

Dr. Nelson explained that the CTD casts usually do not go deeper than 500 meters as that is below the light penetration and the level at which phytoplankton are found. We have done a few deeper casts, more than 4000m, but they were for water profile information.

The basic instrument is designed for both interactive and autonomous operation with internal data logging or direct data transmission. Rugged, vibration and movement tolerant design - basis to the instruments for bench top operation (CytoSense), including moving platforms and outdoor sites, buoy based operation (CytoBuoy) and submersible operation (CytoSub).



Dr Dugdale explained his CytoBuoy and how it was used to filter and analyze plankton.

The student's were able to ask questions about what types of plankton were being studied and what conditions favor plankton blooms. Dr. Landry was able to explain upwelling and a brief description of the HNLC.

### **Upwelling:**

#### ***Description:***

Atmospheric winds generate horizontal currents that move around the ocean's surface. Wind can also generate vertical water motions in processes called upwelling and downwelling. When wind blows over water, the surface water does not move directly in front of the wind but moves about 45 degrees toward the right of the wind's motion in the Northern Hemisphere (Figure 1). This process is called Ekman transport and is a result of the Coriolis effect. In the Southern Hemisphere, surface water is deflected to the left of the wind's motion. Where winds cause the surface water to move away from a coastline

or to *diverge* from another surface water mass, deeper water will move up to the ocean surface, creating an *upwelling* current. Where winds cause the surface water to move toward a coastline or to *converge* with another water mass, the surface water will try to move downward to create a *downwelling* current. For example, northerly winds are common in the summer along the California coast. Winds moving from north to south cause surface water to move toward the west, away from the coastline. Upwelling currents are created, which bring deeper, colder water to the surface. Our coastal waters are cold because of these cold upwelling currents and because of the cold California current (eastern boundary current).

Whereas surface waters are usually depleted of nutrients such as phosphates and nitrates that are critical to plant growth, deeper waters have high concentrations of these nutrients. Upwelling replenishes the surface layers with the nutritional components necessary for biological productivity. Regions of upwelling are among the richest biological areas of the world.

