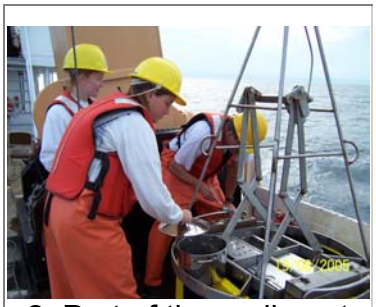
Day 8

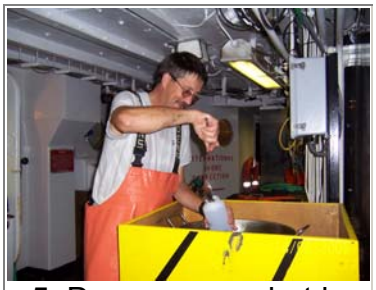
1. Don and Jerry get the sediment grab ready to go overboard.



2. Part of the sediment sample is scooped into a pot.

3. There were lots of sand dollars in this sample.

4. The sediment is washed out of the sample.



5. Don scoops what is left in the sieve into a bottle for storage.

6. Don filters water samples in order to analyze nutrient content.

Date: August 21, 2005
Time: 16:28 GMT 12:28 p.m. EDT

Latitude: 42°32’ N
Longitude: 67°09” W
Wind direction: SW (224 degrees)
Wind speed: 12.7 knots
Sea water temperature: 17.2°C
Sea level pressure: 1011.3 millibars
Cloud cover: Cirrus with light fog

Question of the Day: Why does sediment collect on the ocean floor more rapidly near the coast than it does further out in the ocean?

Yesterday’s Answer: The stern of the ship is at the back, and the sun rises in the east, so the ship must have been heading west.

Science and Technology Log: On this cruise, there are actually two separate but complementary kinds of research going on. We have two scientists from the Environmental Protection Agency (EPA) who are collecting samples of the sediment on the ocean floor, which will be analyzed both biologically and chemically. Biology is the study of living things, so the scientists will look to see what organisms are living in the top layer of the ocean floor. The chemical analysis will show what non-living substances, mainly nitrogen and phosphorus compounds, are present. Chemicals may occur naturally, or may be a result of pollution. This work gives us information about human influence on the ocean ecosystem.

To collect the ocean floor sample, scientists use a sediment grab (picture #1). The "grab" is lowered into the ocean until it hits the bottom, where the container closes and "grabs" a sample of whatever is down there. Then it is hauled back to the surface and opened to see what has been collected. There could be sand, silt, mud, rocks, and any creatures living at the bottom of the ocean. There are two chambers in the grab. From one chamber, the top 2-3 cm of sediment are scooped into a pot, mixed up, and put in jars for later chemical analysis. This thin top layer will yield information about the most recent deposits of sediment. Near the coast, that sample may represent matter that has settled to the ocean floor over a year or so. Further out, that much sediment would take several years to deposit. The contents of the other chamber are dumped into a bucket and washed through a sieve to remove the sediment and leave only the biological parts.

The sieves used for the sediment sample are very much like the ones used for the plankton samples, but bigger and with larger mesh at the bottom (picture #4). The bigger "holes" in the mesh allow silt and sand to be washed out. Whatever is left in the sieve is put into jars and stored in coolers for later analysis. The sample contains evidence of what lives in the benthic layer, the top layer of the ocean floor. This evidence could be plankton, worm tubes, or remains of once-living animals.

At each station where a sediment grab is performed, three water samples are taken, one each from the bottom, the middle, and the surface of the ocean. One liter of each water sample is filtered (picture #6) to analyze its nutrient content. This process is somewhat similar to the chlorophyll filtering I described in yesterday's log. The filters are saved to be analyzed in laboratories, which will look for both dissolved nutrients and particulate matter. Dissolved nutrients are like the sugar that dissolves in your cup of tea – you can't see it, but it's still there. Particulate matter consists of tiny bits (particles) of things such as plankton, whale feces, plants, anything that might be swirling around in the ocean.

The EPA is primarily concerned with human influences on natural environments. By collecting sediment and water data, scientists can see what substances

humans are putting into the ocean, and what effects they are having on the plants and animals living there. This work meshes well with the plankton research work, since the health of the plankton is directly influenced by the health of its environment. Everything in the natural world is connected, and we humans must learn how to balance our wants and needs with the needs of all other living things. If we are not careful about how we use our Earth, we will upset the balance of nature and create negative consequences that we may not see for years. For example, if chemicals dumped into the ocean (on purpose or accidentally) kill large numbers of phytoplankton, then the entire food web will be disrupted in a kind of ripple effect, like a stone dropped into a pond. The zooplankton (who eat phytoplankton) will starve, and the animals that eat zooplankton will either starve or move to a different part of the ocean, which in turn changes that part of the ecosystem. From this very small example, maybe you can see how huge our responsibility is to keep our oceans (and other environments) clean.

Personal Log: I am so grateful to Jerry Prezioso, our NOAA chief scientist, and Don Cobb, our EPA scientist. They have included me in all of their operations from Day 1, and have been infinitely patient with my many questions. They have explained things over and over until I "got it", from procedures for collecting samples to the science behind all their work. It has been eye-opening to be on the student side of learning. Many times I have not even had enough background knowledge to know what questions to ask, or have been almost paralyzed with fear that I might do something wrong and skew someone's data. I know this experience will help me better understand my students who go through these same feelings of anxiety and joy when they are learning something new.

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