April 10, 2010 - Week #5: CLIVAR 13.5 Update

We are currently at Station 99 (out of 129), at about 5 degrees south, 3 degrees west. We are continuing sailing northward through the tropical waters of the South Atlantic, doing CTD casts, collecting water samples, running the analyses, and processing the data. The daily routine is the same as it has been for the past month but there is something new recently – the feeling that the expedition is gradually winding down. We are scheduled to arrive in Takoradi, Ghana in about 1 week. A few days ago we crossed the prime meridian and moved from the Eastern hemisphere, where we have been from the very beginning of the trip, into the Western hemisphere. So far, the Western hemisphere appears guite similar to the Eastern one. We should cross the equator in a few days. We were recently reminded of the great power of the ocean on a recent hydrocast. By accident, one of the 24 water sample bottles was most likely lowered into the water column closed (and full of air). The water pressure on the bottle at depth was so great that it caused the closed bottle to implode. When the rosette came back to the surface, about the only thing that was left from the bottle was the interior steel spring. On the attached photo you can see what the implosion caused by the abyssal water pressure did to this spring!

So far in our weekly updates we have discussed carbon-related measurements, anthropogenic tracers, and the physical parameters. Next come the biogeochemical measurements: nutrients (nitrate, nitrite, phosphate, dissolved silicate), oxygen, and DOC (dissolved organic carbon). In the attached photos you can see the set-up for measuring nutrients, the oxygen analyzer at work, and the process of freezing of DOC samples that are to be analyzed at a later time on land.

The observed distribution of these compounds in the ocean water is a result of the interaction of physical, chemical and biological processes. Biology affects tracer distribution through production and decay of organic matter. During photosynthesis in the sun-lit layer of the ocean, phytoplankton take up dissolved inorganic carbon and nutrients to produce organic matter and oxygen. The reverse happens during remineralization: organic matter and oxygen are consumed, and dissolved inorganic carbon and nutrients are released back into the water column. Physical processes affect tracer distribution by mixing and advecting water with different characteristics. By carefully studying the distribution of the biogeochemical tracers in the ocean and employing other available information (e.g. LADCP currents, CFCs, etc.) oceanographers are slowly piecing together the complexity of the interaction of ocean biology, chemistry and physics.







