A16S Chief Scientists' Update #1. December 29, 2013

Ho, Ho, Ho and South we go.

The Global Ocean Sustained Hydrographic Investigation Program (GO-SHIP) A16S(outh) line is underway. In numbers, the trip to Punta Arena, Chile will take 45 days and cover roughly 6000 miles. The ship will burn about 170,000 gallons of diesel fuel (and release close to 4 million pounds of carbon dioxide) in the process. We plan to occupy 114 stations where we'll sample the ocean from surface to bottom. Of the 28 scientists on board, 8 did the preceding A16N(orth) cruise this past summer and will have transited the entire Atlantic Ocean from 63 N to 60 S by the end of A16S.

We left Recife, Brazil on December 23 after a two-day delay waiting for a critical component of our effort, a 10-km long cable that is used to lower our sampling devices and instruments to the bottom of the ocean. This specialized cable contains conducting wires, surrounded by metal strands as strength members, to transmit sensor signals to the surface. If strung out it would take a world-class runner 27 minutes to run the length of it. We occupied our first station at 6 S, 25 W, where the A16N cruise left of in September, on Christmas day. It was a great present for all to see the cruise commence after an arduous multi-year planning process.

The so-called CTD/Rosette/bottle package, or in short "the package", is the center of operations (see attached figures). Every 30 miles the package is placed overboard and lowered to the bottom at a speed of 2.3 miles and hour. The journey down takes about 1½ hours during which temperature, salinity, oxygen, fluorescence, particles, temperature microstructure, current, and pressure are measured and sent to a display console on the ship. On the way up 24, 3 gallon sample bottles are closed at designated depths to capture water samples. Once the package is on deck the water is subsampled for over a dozen chemicals ranging from classic oceanographic parameters such as salinity and oxygen, to more esoteric compounds such a tritium and Freon. Each serves their unique purpose of characterizing the ocean, the biogeochemical cycles and the changes thereof. The organized chaos of six to eight scientists trying to sample the bottles is overseen by a "sample cop" who watches out over proper sampling sequence and that no one takes more than their allotted share of water for analyses.

The GO-SHIP program is part of an international effort to reoccupy select transects of all the world's oceans at approximately 10-year intervals. The US component of the program is jointly sponsored by the National Science Foundation (NSF) and NOAA and performs 2 cruises per year. Most large programs are designated with catchy acronyms, which sometimes even are meaningful when spelled out. This line was previously occupied as part of SAVE in 1989; it was sampled down to 42 S (in the austral winter) as OACES in 1991; while the CLIVAR/CO2 occupation occurred in 2005. In future correspondences we'll describe some of the changes we are observing since our last visit 9 years ago.

Currently we are at 12 °S, 25 °W, with more than 3 miles of seawater below us and 500 miles from land, and ready to occupy Station 13. The weather has been nice with steady trade winds of about 15 knots and azure blue seas. All is well onboard and only 100 more stations to go!

Rik & Leticia, Chief Scientists, GO-SHIP A16S Cruise

SAVE : South Atlantic Ventilation Experiment OACES: Ocean Atmosphere Carbon Exchange Study CLIVAR/CO2: Climate variability and ocean carbon studies



Picture 1: The 2000-pound CTD/Rosette Bottle package being lifted out of the water after its journey to the deep.



Picture 2: "Package" on deck. The 24 water sampling bottles are strung around the frame. The electronic sensors are underneath and in the middle. A package was lost during A16N when the cable broke at 1100 m leaving a quarter of a million dollars of equipment on the seafloor and

requiring an emergency shipment of new wire from Seattle to Recife, Brazil at the start of the cruise. In the 40 years that these devices have been deployed, over a dozen packages have been lost on various research cruises, their graves well-marked with GPS but with no means to retrieve them.