A16S Chief Scientists' update #2. Jan. 5, 2014
Updates are posted at www.aoml.noaa.gov/ocd/gcc/A16S

Going down the line.

First of all, the science party on A16S are wishing all landlubbers a happy and healthy New Year. Since time is rather an abstract notion at sea, we celebrated the New Year several times. The BBC world news channel, that is received on the ship, showed the fireworks in Dubai at 6 PM. At the New year's costume party in the ship's exercise room, the "official" ringing in of New Year occurred at midnight UTC/GMT while the celebrations continued till midnight shiptime two hours later. Then we sent New Year's wishes to colleagues and family from the East Coast to Hawaii later in the day. Since all US research vessels are dry ships, the toasts were done with fizzy soda pop.

The ship did not change time when heading east of Recife and we are about 2 hours ahead of local time with sunrise at 4 AM and sunset just before dinner right after 5 PM. Sunsets have been beautiful and the topic of conversation at dinner often is who saw the green flash, or if it even exists. Most of the timekeeping is expressed as hours till the next meal.

The cruise is proceeding along nicely and every day we look forward to another routine day of calm seas, nice weather, a trace metal cast and three to four CTD sampling casts. On average we spend a little over 4 hours on station and 3 hours steaming between stations. Anything out of the routine generally spells trouble, often mechanical or instrument failures. This week we had some slight delays with a balky altimeter that determines how close the CTD package is to the bottom. We generally get the deepest sample within 10 meters from the bottom. At 6-km (3.7 miles) depth this is a nerve wracking feat ,as putting "the package in the mud" is not desirable. On Saturday the level-wind of the trace metal winch failed with the package at 600 m. The deck crew assisted in the upcast by leveling the wire wraps on the drum by hand. While the handspun drum was an artisan's delight, it was clear that a mechanical leveling is much preferred. The cause of failure was quickly discovered, and Megan and John from the engineering department of the R. H. BROWN did a comprehensive repair while Prof. Measures (U. Hawaii) made himself useful in the repair by holding a large umbrella for shade from the blazing sun for the crew working on the winch.

The general operations, and many of the physical and chemical measurement protocols for these cruises have remained unchanged for decades. However, we are taking advantage of improved technology and computer assisted automation. Most of the analytical instruments on board are largely computer controlled, increasing the number of samples that can be analyzed and the accuracy of the measurements. A big change in the current program is that there is a data manager onboard and a sophisticated ship-based internet site that serves as a central depository of the data we acquire. It also provides access to data from previous cruises and has a real time display (see, Figures 1 and 2) of current location and time till the next station. Preliminary data from ship-based analyses of each group are sent to the data manager who merges them such that all parameters measured at a particular station and depth are collated. This makes it possible to do much of the quality control and error checks of the parameters onboard, and provides a first glimpse of the evolving oceanographic patterns (see, Figure 3). We leave the ship with a near-

final data set of measured parameters. On shore final checks and calibrations are performed and shore-based measurements are added. This management system is instrumental in fulfilling our mandate for open release of quality controlled data within 6-months of completion of the measurements. In the past it took years to get a full dataset assembled. Data, including preliminary data as soon as the ship reaches port are provided at the CLIVAR & Carbon Hydrographic Data Office: (cchdo.ucsd.edu). CDIAC Ocean CO2, (cdiac.ornl.gov/oceans/) serves as the long-term depository for the carbon related measurements. The shipboard data manager, Alex Quintero is from the Scripps Institute of Oceanography Shipboard Operations Group who provide data support for all the US GO-SHIP/CLIVAR cruises, and are funded by NSF.

Currently we are at 23 ˚S, 25 ˚W, with more than 3 miles of seawater below us and deploying a CTD at Station 35. The weather continues to be nice with calm seas. All is well onboard and only 77 more stations to go!

Rik & Leticia,
Chief Scientists GO-SHIP A16S

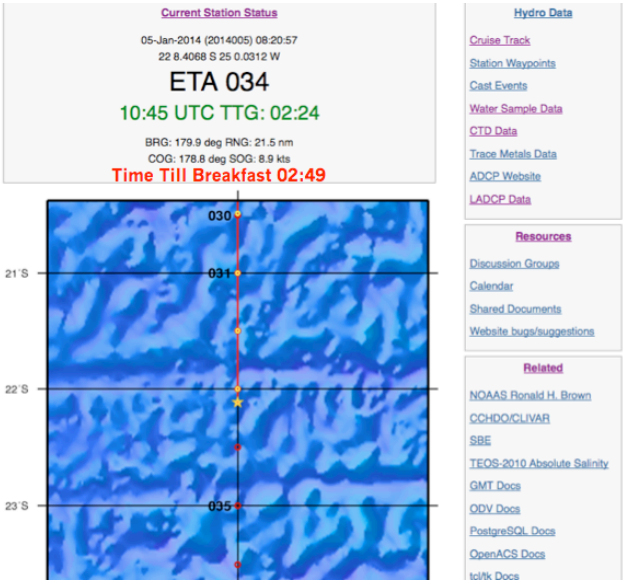

Figure 1: Screenshot of the front page of the shipboard data management system real-time display screen that can be viewed from any of the many computers on the ship. The time till breakfast is currently “photo-shopped” but the data manager is working on this critical enhancement.

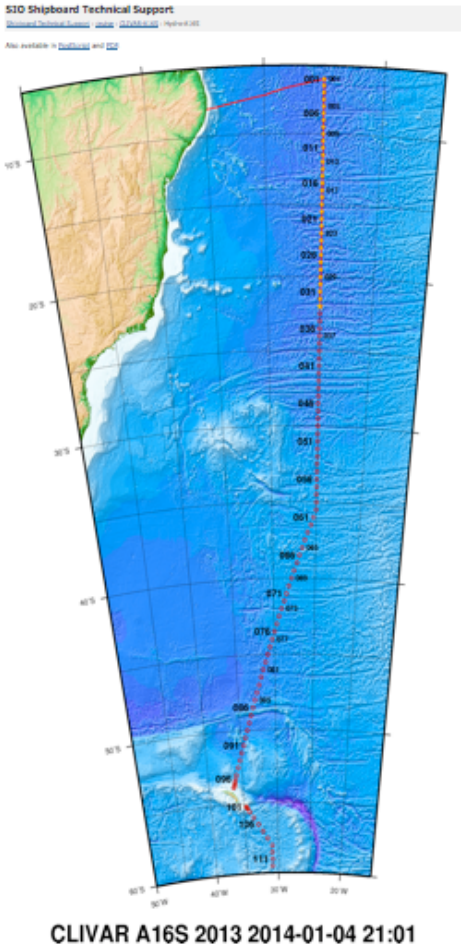

Figure 2: Station map of A16S for keeping track of the stations completed (red) and those to go.

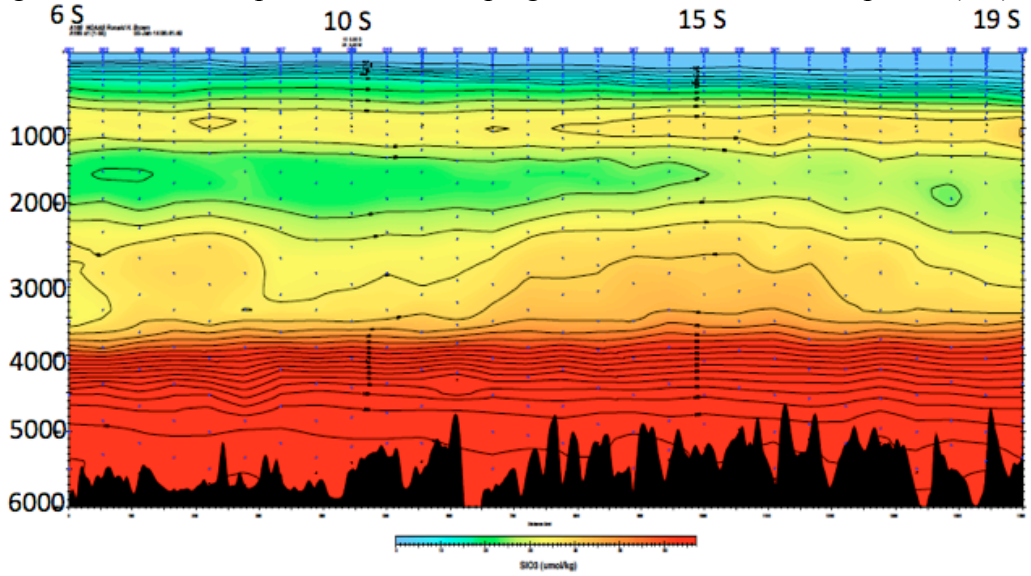

Figure 3: A cross section of silicate levels in seawater measured on A16S using the shipbased data management and quality control plotting routines. The first 29 stations from 6 ˚S to 19 ˚S are plotted against depth (0-6000 m, or 0 to 3.75 miles). The black dots are the sampling depths

of the 700+ samples taken so far. Silicate is a building block for shell forming organisms such as diatoms but because of slow dissolution in the deep ocean it is also used as a tracer of water masses. Many diatoms live, die, and decompose in the Southern Ocean such that water masses that are formed in the South contain more silicate. The cross section nicely shows the interleaving of Antarctic Bottom Water with high silicate levels (≈4000-6000 m) coming from the South; the lower levels in North Atlantic Deep Water (≈2000-4000 m) from the North and the Antarctic Intermediate Water from the South. Surface waters are depleted in silicate in this region due to incorporation into shells of organisms. As we travel southward the northern component will diminish and water from southern origin will come closer to the surface. Measurements by Charles Fisher, AOML and Eric Wisegarver, PMEL