

The second Gulf of Mexico & East Coast Carbon (GOMECC-2) cruise is underway,

The second Gulf of Mexico & East Coast Carbon (GOMECC-2) is taking place to perform a large-scale survey of ocean acidification trends and dynamics in the Gulf of Mexico and East Coast of the USA on NOAA ship Ronald H. Brown from July 21 through August 13. Twenty-two scientists from seven different institutions are participating in the effort. The survey includes 8 cross-shelf transects where the full water column will be measured for a comprehensive suite of biogeochemical parameters that affect or are affected by ocean acidification. Between transects the ship will take extensive measurements of surface water conditions with highly automated instruments sampling the coastal ocean predominantly at depths between 30 and 100m. Further details on operations, participating institutions and cruise track can be found at <http://www.aoml.noaa.gov/ocd/gcc/GOMECC2/>

It seems like distant past when we left Miami. After a trying and costly loading in the Port of Miami, NOAA ship Ronald H. Brown sailed out of Government Cut at noon Saturday July 21. During the in-port the rules and regulations of port access got stricter by the hour. A crane and a full crew of stevedores had to be hired at the last minute to load two containers onto the ship, as the ship's crane was not allowed to be used. During the second day of loading only government vehicles were allowed on the pier such that we were left with loading the gear from the rental trucks that arrived from Mississippi and Georgia into a government vehicle outside the gates to get the equipment ship-side and lug each crate up the gangplank. Just what the members of the scientific party wanted to do after a very long drive..... But all was dealt with ingenuity and good cheer.

Setup went very well and all instruments were set up and secured, and many working by the time we left. Several of us had bouts of "mal de mer" for the first day despite relatively calm seas. An inquiry if the seas were considered moderately rough drew snickers from the more seasoned scientists and crew. By Monday morning the seas calmed even more and mess hall was filled. Weather has been great since with calm seas.

The number of instruments and technologies to study ocean acidification in the East coast and Gulf Coast realm is impressive. Instruments range from those performing state-of-the-art analyses to the highest accuracy to very novel ones. Many are set up around the spigot of the uncontaminated seawater line in the hydro lab. They include the underway pCO₂ system that has been a permanent installation measuring surface water pCO₂ levels wherever the BROWN sails. For this cruise these measurements have been augmented with the Multi-parameter Inorganic Carbon Analyzer (MICA) from the University of South Florida that measures total inorganic carbon, pH, and pCO₂. The "barrel of optics" from the University of New Hampshire is situated in a large drain pan. This is a large barrel with continuous water feeds that include an oxygen sensor, fluorometer, spectrophotometers, and a transmissometer. Most of the optics are used to determine biological parameters and processes in the ocean.

Sampling at depth is done using special 10 liter bottles that can be closed at designated depths (Niskin bottles). The frame holds 24 bottles and includes instruments to measure conductivity (salinity), temperature and depth (CTD), and oxygen. For GOMECC-2 5 different optical sensors are included. These parameter are monitored when the package goes down to get a first look at

biogeochemical features and physical structure of the water column. These traces are used to determine at what depth samples will be taken. A novel profiling spectrophotometric pH meter is strapped to the frame as well. The instrument can resolve the depth structure of pH at a resolution to 2 m.

The fun really starts when the CTD and bottles come back on deck and we descend as hyenas on a cadaver to subsample the Niskins for a favorite parameter. A pecking order has been established on sequence of subsampling based on possibility of sample degradation and contamination.

We started the 100-mile Mississippi line of CTD/Niskin profiles on Monday evening and just completed 11 stations in the wee hours of Wednesday morning. It was 36 hours of non-stop action. An added challenge was the many drilling rigs and support ships that are in the region. The depth of the water near-shore was less than 20 m and it felt like the ship was transiting through a big city, particularly at night when the oilrigs are lit up like Christmas trees.

This first CTD transect went very well. The depth profiles showed strong interleaving of relatively high oxygen values with much lower values that we suspect are coming from the low oxygen “dead zones” near the coast of Mississippi. Our last three shallow stations were parallel to the coast through the area where the dead zone of low oxygen waters develops each summer. Initial analyses suggest levels close to hypoxia below 15 m in the region and we are awaiting the analyses of carbon parameters and pH. One of our scientific objectives is to determine the correlation of low oxygen with the parameters affecting ocean acidification and we should have ample samples to study this further.

Our steam and dream transit to the Tampa CTD section just got interrupted by a fire alarm because of smoke in the engine room that was associated with an electrical generator failure. Because we are operating around the clock many were rudely awakened and there were many sleepy scientist mustering in the science lab. Our fire drill right after departure came to good use and all followed proper procedure. The generator issue is under control but command and crew are busy getting all systems back up after a shipwide electrical blackout associated with the failure.

Never a dull moment
Rik and Leticia,
Chief scientists GOMECC-2



Picture of the fantail of the Brown off the coast of Mississippi with oil rigs in the background Wednesday Jul 24. The CTD with Niskin bottles and pH profiler strapped to the side is in the foreground. (courtesy Andrew Margolin)