

GOMECC-2 Update #2: Voted off the ship

The first 10 days of the second Gulf of Mexico & East Coast Carbon (GOMECC-2) went very well. Seas have been calm, the many sophisticated instruments are behaving well, and operations are proceeding smoothly. The efficient execution of the science and good ship speed even allowed for a short shore-side excursion.

Scientists, officers and crew are all engaged in operations and are showing great interest in the project objectives. However, it became apparent that our presentation about ocean acidification given to the crew might have been overdramatized when a crewmember mentioned that he had dreamed that the whole ocean had turned into carbonated soda pop and he was trying to drink it. He commented: “ It tasted like Sprite- and I don’t even like Sprite”.

After finishing the CTD transect off the coast of Mississippi, we followed the coastline towards the big bend region of Western Florida (for a cruise track see the attached figure). We crossed the outer edges of the Mississippi river plume that showed the effects of biological productivity with low surface water carbon levels and higher pH than surrounding waters. Once beyond this region the coastal ocean acted as a variable but strong CO₂ source to the atmosphere.

The cruise then proceeded offshore for the start of the Tampa/St Petersburg line several hundred miles offshore in water depths of about 2 miles and proceeded to a few miles off the coast in depths less than 60 feet. The deep-water chemistry changes are very small over time and the measurements are used, in part, to check how well the instruments perform. Our preliminary results show almost identical values for biogeochemical and physical parameters as our previous cruise in 2007 in deep water giving added confidence that changes we are seeing closer to the surface are real. Surface parameters are showing significant differences and high variability. While the variability far offshore was at first puzzling satellite imagery of chlorophyll, sea surface height, and particular sea surface temperature showed appreciable small-scale changes. The satellite imagery provided to us by the NOAA Coastwatch Caribbean/Gulf of Mexico Regional Node (<http://cwcsaribbean.aoml.noaa.gov/data.html>) and other sources offers the unique opportunities to put our observations into regional context and to provide a means to interpolate our data over larger scales. Other opportunities to obtain greater coverage are the sensors we place on ships of opportunity. By following our progress on the NOAA ship tracker site (<http://shiptracker.noaa.gov/shiptracker.html>) which is updated hourly with ship location and key surface measurements, we noticed that we were within 50 miles of NOAA ship Gordon Gunter that plies the waters of the GoM year round on which we have automated instruments. Combining these data sources will provide a great ocean acidification dataset for the region

A major goal of our measurements is to obtain a more detailed characterization of the chemical parameters that impact ecosystems. Most of the efforts to date have looked at how bulk carbon parameters such as pH, total inorganic carbon and alkalinity are affecting growth of organisms but laboratory studies suggest that individual chemical species have an impact. Thus besides measuring the bulk inorganic carbon parameter participants from the University of Georgia are taking samples for Calcium a major building block for shells and the University of South Florida team are providing measurements of carbonate ion concentrations, which is critical for shell formation as well. All in all we take up to 15 different measurements from each depth samples.

Each measurement requires different containers and it is quite a site around the Niskin CTD Rosette with Siskins when the cast comes up with boxes filled with glass bottles of different shapes and sizes, plastic bottles ranging in size from 2 gallons to 2 ounces and pricey spectrophotometer cells.

We got a pleasant reward for our hard and efficient work and fast progress by an unexpected stop of several hours at Fort Jefferson in the Dry Tortugas. A small boat ferried us to the island for a tour of the fort and swimming and snorkeling opportunities in the pristine waters. Of course, all the while our automated instruments were taking measurements on board so no science time was wasted!

The last notable event in this weekly report is that we copied popular TV series with an “off the ship vote”. Much to my consternation I (Rik W) received most votes and together with Kyle Seaton were sent packing to Miami. Our division director, Dr. Michelle Wood is taking over as chief scientist and will lend her expertise on phytoplankton growth and ecology to the effort. I’m back in the office and will follow the ship from afar while it makes its way up the East Coast.

Rik & Leticia, Chief Scientists

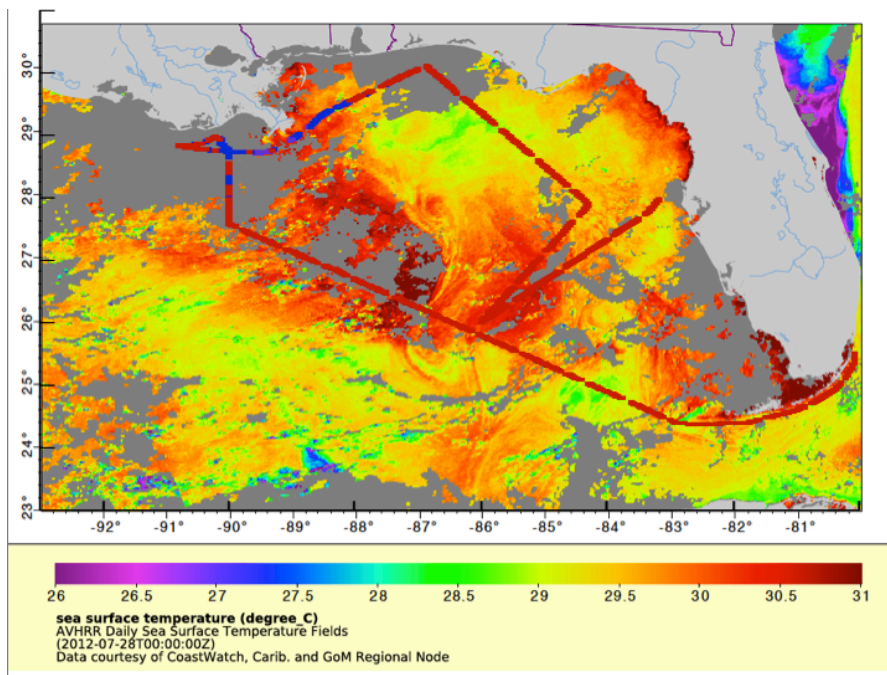


Figure:

Cruise track superimposed on a satellite sea surface temperature (SST) image. The variability and fine structure seen in the SST was also reflected in the biogeochemical measurements. The cruise track is shown in red and blue where the red line indicated that the area was a CO₂ source with relatively low pH, and the blue line indicates a CO₂ sink (higher pH). The sink areas are in the Mississippi effluent whose nutrient laden waters enhance productivity in the surrounding ocean and lower CO₂ levels.

