My month at sea sampling coastal waters with NOAA

Andrew R. Margolin

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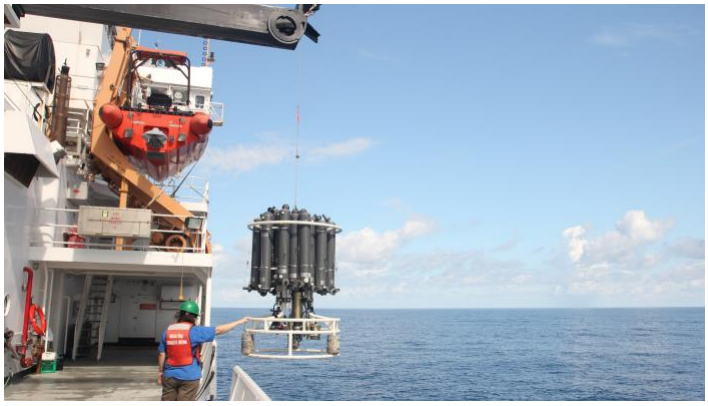
Before beginning at the Rosenstiel School, I had the opportunity to participate in NOAA's second Gulf of Mexico and East Coast Carbon (GOMECC-2) cruise through the Cooperative Institute for Marine and Atmospheric Studies (CIMAS) at the University of Miami. After driving to Miami from Massachusetts and moving all of my belongings into storage, I moved on to the research vessel *Ronald H. Brown*, which would become my home over the next twenty-four days. We set sail from Miami on 21 July 2012, heading into the Gulf of Mexico to begin sampling and analyzing seawater for its physical and biogeochemical properties.



Deploying the rosette on the Tampa transect in the Gulf of Mexico on 28 July 2012. Photo: A. Margolin.

We collected seawater throughout the water column using a 24-bottle rosette along eight transects that were approximately perpendicular to the coast, beginning the first transect near Louisiana and ending with the eighth in the Gulf of Maine on 13 August. In addition to the transects, we also collected surface water samples while in transit between each transect and the majority of the samples collected were also analyzed at sea aboard, keeping us busy during the course of the cruise. Analyses conducted at sea included salinity, oxygen, nutrients, dissolved inorganic carbon, total alkalinity, the fugacity of CO_2 (fCO_2) and pH, which will be used in conjunction with other parameters that are being measured in land-based laboratories to improve our understanding coastal ocean acidification.

My duties at sea were to collect seawater samples and perform the analysis of the fCO_2 for all samples collected along the eight transects and while in transit. In addition to fCO_2, I also collected samples for the analysis of total organic carbon (TOC), which I have here at RSMAS and have recently begun analysis within the next couple of weeks in the Hansell Lab. Once I begin analysis, I will investigate TOC's relationship with the other seawater properties that were measured and also compare TOC concentrations along transects in the Gulf of Mexico with transects on the Atlantic coast. As a result of my participation in the GOMECC-2 cruise, nearly 600 seawater samples were collected for TOC analysis along seven sections and approximately 1,200 seawater samples from all eight sections were analyzed for fCO_2 by me and my supervisor, Kevin Sullivan (CIMAS).

The responsibility of collecting and analyzing samples was typically shared by two people, alternately working around the clock on opposite, twelve-hour shifts. For the GOMECC-2 cruise, the majority of the scientists had shifts beginning and ending at 3 o'clock, however, the fCO_2 shifts began and ended at 1 o'clock. I had the shift that began at 1 am, which was challenging to get used to and to get back to a normal sleep schedule after the cruise, but during the cruise I couldn't have been happier with my shift. I was able to overlap with the 3 PM to 3 AM shift for a couple hours and get to know that group while sampling from the rosette or while taking a break to gaze at a sky full of stars, highlighted by the glowing Milky Way. It was also nice to get to know the people who I spent the majority of my shift working with while sampling on deck, watching sunrises together or enjoying meals together. My shift was perfect for maintaining high morale over the course of the cruise.

Every morning I woke up it would be dark and I would have my typical breakfast of instant oatmeal, occasionally topping it off with a left over dessert from the day before. I always worked through the 3 o'clock shift change and had an assortment of friendly faces to work with, which made the morning go by extremely fast. Sunrise always marked the middle of my shift, whether I was on deck sampling or taking a quick break

to watch the sky brighten with an assortment of colors and feel the warmth that came along with the sun, reminding me that breakfast would soon be served. After breakfast remained a half day of work, which always found ways to surprise me with visits from pods of dolphins or pilot whales, or even schools of sergeant major fish on a detour to the Dry Tortugas National Park that we took before exchanging chief scientists in Miami.

The GOMECC-2 cruise was twenty-four days long and a great opportunity for me to meet scientists and students from universities in the eastern United States, as well as to meet scientists from RSMAS, CIMAS and NOAA. It was also a great opportunity for me to establish myself as a part of the RSMAS family before beginning graduate school, and I look forward to the next opportunity to participate in a NOAA research cruise.

Sunset in the Gulf of Mexico on 25 July 2012. Photo: A. Margolin.

Andrew

Thanks to the Billfish Foundation and Costa Del Mar, from the Ross Sea, Antarctica

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Presently, I am on the western edge of the Ross Sea (74.2°S, 169.5°E) samp-ling seawater to understand how algal produced organic carbon is exported (sinks) out of the surface ocean and becomes resuspended or solubilized in the water column. I am here with my two lab mates, Meredith Jennings and Sarah Bercovici, and our advisor, Prof. Dennis Hansell, participating in an expedition that Dennis initiated, called 'TRACERS.' TRACERS is short for TRacing the fate of Algal Carbon Export in the Ross Sea, and that is exactly what we are doing here. We are working in collaboration with scientists from College of Charleston, the Institute for Systems Biology (ISB), Old Dominion University, Stanford University and University of Vienna to understand this export at the end of the Ross Sea's algal bloom season. For more information on our expedition and the participants from the various institutes, check out the expedition blog at http://www.tracers-nbp1302.blogspot.com.

Me on the RVIB Nathaniel B. Palmer, heading to Terra Nova Bay in the western Ross Sea on 28 Feb. 2013. Photo: A. Lee.

Prior to beginning the TRACERS Expedition, I had the privilege of spending two weeks traveling around the South Island of New Zealand with an expedition mate, Allison Lee (ISB). Allison and I spent four days backpacking and camping along the Routeburn Track (a.k.a. Isengard from *the Lord of the Rings*) and a few days in Doubtful Sound, kayaking through the beautiful fjords of Fiordland National Park. We also traveled to Christchurch, Queenstown and Te Anau to enjoy some New Zealand culture.

Taking a break from kayaking in Doubtful Sound (left), and paddling before seeing a pod of ~10 dolphins (right) on 30 Jan. 2013. Photos: A. Lee.

Running the McMurdo Half Marathon on 10 Feb. 2013, dressed as a layered-up version of the 5K's Spider-Man. Photo: USAP.

After our New Zealand travels, we were outfitted for Antarctica in Christchurch and then we flew to McMurdo Station to get ready for our 53-day expedition in the Ross Sea and Southern Ocean. Once we arrived at McMurdo Station, our group was busy with orientations and last-minute preparations, but we also managed to squeeze in some fun activities while at McMurdo. Allison and I organized the 'Antarctica 5K' for TRACERS Expedition participants, which took place on February 9th, going from McMurdo Station to Scott Base (NZ) and back. For the 5K, I ran it dressed as Spider-Man, which added to the experience, making it one I will never forget. Coincidently, a day after the 5K was the McMurdo Marathon, so I made the last-minute decision of running the half marathon before spending two long months at sea.

On deck before deploying a sediment trap in Terra Nova Bay on 22 Feb. 2013. Photo: C. Brooks.

Shortly after finishing the McMurdo Half Marathon, I boarded the research vessel icebreaker (RVIB) *Nathaniel B. Palmer* with all of my expedition mates and we began unpacking all of our equipment and setting up our lab spaces over the course of the next few days. Before we knew it, February 12th had passed and we embarked on our journey to study the biogeochemistry of the Ross Sea. We began the expedition with a few minor setbacks, such has as an emergency return to McMurdo Station (which was handled professionally by our onboard EMT), bad weather and some of us coping with seasickness.

Now that we are two weeks into our expedition and know all of our sampling and analytical procedures fluently (captured here in a 60-second video), we occasionally make time to go up to the bridge or the bow to look at the beautiful ice floes, icebergs and wildlife that we frequently encounter. In addition to the wonderful scenery that we have nearly every day out here (when there's a storm that whites out the sky, the view can be pretty drab), we also have many creature comforts onboard, such as amazing desserts that keep us content while confined to the ship.

Molting Adélie penguins (Pygoscelis adeliae) about to jump into the freezing water on 18 Feb. 2013. Photo: A. Margolin.

We disembark from the expedition in Punta Arenas, Chile on April 5th and we look forward to sharing many more stories with you from the Ross Sea. Stay tuned, and follow the TRACERS Blog! Send us an email at tracers-blog@nbp.usap.gov [email no longer available] if you have any questions and/or would like to be added to our email list!

With all that said, I want to thank the Billfish Foundation and Costa Del Mar not only for the sunglasses that they awarded me for my earlier blog post, but also to thank them for creating an incentive for us young scientists at RSMAS to write blog posts about our research by utilizing media platforms that engage people in the importance of studying the earth.

The first sunset that I'd seen in weeks, which lasted for hours and peaked at about 1:30 AM on 17 Feb. 2013. Photo: A. Margolin.

Thanks again!
Andrew

The Hansell Lab is at it again!

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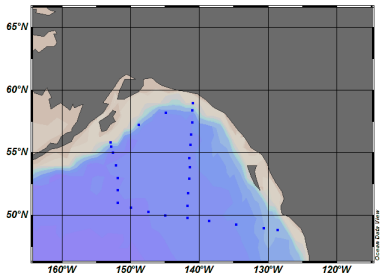
We just left Seattle yesterday, August 4th, aboard the R/V *Melville* to sample Deep Ocean Refractory Carbon (or DORC) to understand the carbon deficit found in the North Pacific as deep waters overturn and form intermediate water. Over the past few days we moved all of our science equipment and personal belongings aboard while the ship was docked at the University of Washington, and everything has gone smoothly so far. Now that it is the 5th, we have arrived on our first station and have lowered the CTD-rosette to collect seawater samples throughout the water column. I will do my best to post to the RSMAS Blog over the course of out three-week cruise, but other students from the University of Georgia have set up a science blog to share what we are working on here in the Gulf of Alaska. The science blog can be found at dorcscientists.blogspot.com.

Left to right: Andrew, Meredith, Sarah and Dennis as we pass by the Space Needle on our way to Puget Sound. Photo: B. Tolar.



Our cruise track and sampling stations marked as blue dots in the far Northeast Pacific and Gulf of Alaska.

Wish us luck on this new scientific adventure!
Andrew