



The Anchor

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Where in the World?

By David Sims

CCOM/JHC researchers ply the seas mapping the unknown during the 2011 field season

From late May through October, CCOM/JHC faculty, staff, and students sailed the seas from coastal New England to the Gulf of Mexico, the Galapagos, Hawaii, and the Arctic. Over two dozen people from the Center aboard more than half a dozen different vessels mapped and explored the ocean floor in a diversity of capacities—from the Law of the Sea to deep-sea gas seeps, hydrothermal vents, marine habitats, and plate tectonics. Below are summaries of ten of these diverse cruises.

Arctic – Law of the Sea

Continuing to lead the U.S. role in mapping the Arctic under the United Nations Convention on the Law of the Sea (UNCLOS), a group of CCOM/JHC researchers were again aboard the U.S. Coast Guard Cutter *Healy* as part of a 45-day cooperative U.S.-Canada mapping cruise in the Arctic Ocean, which began in Barrow and ended in Dutch Harbor, Alaska.



HEALY has a close encounter with LOUIS S. ST. LAURENT.

Since 2003, the Center has led six cruises aboard *Healy* to collect more than 218,200 square kilometers of bathymetric data to latitudes beyond 88 degrees north.

For the 2011 cruise, the CCOM team was led by chief scientist Larry Mayer and co-chief scientist Andy Armstrong and included research associate professor Brian Calder, research scientist Roland Arsenault, and graduate students Jorge Alavera, Tami Beduhn, Christina Fandel, Ashton Flinders, Dandan Miao, and Garrett Mitchell.

The expedition, which began in early August, was the fourth joint cruise in a multiyear seafloor mapping project to delineate an extended continental shelf in the Arctic by collecting multibeam bathymetry. Canadian scientists collected seismic reflection profiles from the Canadian Coast Guard Ship *Louis S. St. Laurent*.

Because icebreaking can reduce the quality of the mapping data, the two ships took turns clearing a path for each other, with the resulting sonar and seismic data being shared between the U.S. and Canada. It's a partnership born of necessity—neither country has two icebreakers capable of the task.

"As in previous Arctic missions, we obtained data in areas we were not entirely sure the ice would allow us to proceed, even with a two-ship operation," Armstrong noted. "This was especially true in the eastern part of the Canada Basin where some of the thickest Arctic ice is found."

Under the UNCLOS, each coastal state automatically has exclusive rights over seabed resources out to 200 nautical miles from shore. Beyond that distance, coastal states must demonstrate that the seabed in any particular area is a "natural prolongation" of the continental shelf closer to shore.



CCOM grad students aboard HEALY (note the tiny LOUIS almost on the horizon); clockwise from top left: Christy Fandel, Ashton Flinders, Garrett Mitchell, Dandan Miao, Jorge Alvarado, Tami Beduhn.

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Throughout the cruise, Capt. Armstrong updated a daily blog of activities. Armstrong's penultimate blog entry from September 23 reads in part:

"...we spent today filling in gaps in seafloor mapping coverage along the continental shelf of Alaska's North Slope. Our mapping coverage is made up of data from dedicated surveys like this one and from the collection of transit track lines *Healy* makes while underway for other Arctic science missions. We also have multibeam echo sounder data in the Arctic that we have obtained from other Arctic research vessels and icebreakers, including *Oden* from Sweden, and the *Mirai* from Japan. The researchers on these ships have graciously shared their mapping data, as we share ours, so that the bathymetric map of the Arctic can be continually improved. On this cruise, we have mapped 18,200 square nautical miles of the Arctic seafloor."

Galapagos Rift Exploration – Seafloor and Water Column Mapping, Hydrothermal Vent Hunting, and Biologic and Geologic ROV Exploration

For 50 days in June and July aboard the NOAA Ship *Okeanos Explorer*, a team of scientists and technicians, including Meme Lobecker of the NOAA/CCOM Integrated Ocean and Coastal Mapping (IOCM) Center and CCOM doctoral student Mashoor Malik, conducted exploratory seafloor mapping operations in preparation for further investigation of the diversity and distribution of deep-sea habitats and marine life over the Galapagos Rift. Lobecker and Malik are physical scientists with the NOAA Office of Ocean Exploration and Research (OER).



NOAA physical scientist Meme Lobecker with the *Bridge of the Americas* in the background as *OKEANOS EXPLORER* makes a night transit through the Panama Canal.

The rift lies over the junction of the Nazca and Cocos tectonic plates and is a known site of active hydrothermal venting. The expedition was divided into two legs and included work in the

Exclusive Economic Zones of Ecuador and Costa Rica, and international waters.

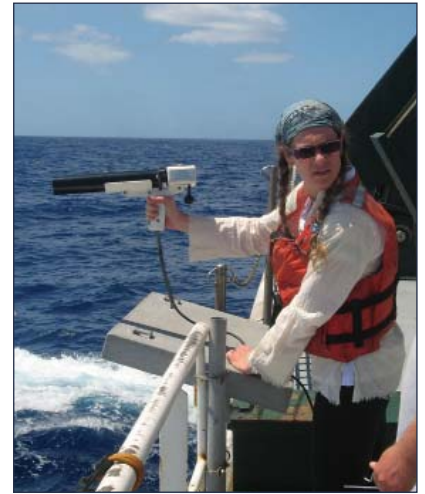
In addition to mapping the seafloor and water column using the ship's .5° x 1° EM 302 multi-beam sonar and exploring the water column for hydrothermal venting activity with a CTD (conductivity, temperature, and depth) rosette, participating scientists from the Woods Hole Oceanographic Institute, the Pacific Environmental Marine Laboratory, the University of South Carolina, and the University of Massachusetts also used the remotely operated vehicle (ROV) *Little Hercules* and the camera and lighting platform *Seirios* to explore in finer detail the geologic and biologic characteristics of the seabed.

The ship's telepresence capabilities were used to broadcast the data collection screens in real-time to Exploration Command Centers around the U.S. and to the general public on the *Okeanos Explorer* website. Scientists on shore were able to see the multibeam CTD tow-yo, and ROV high-definition imagery data in real-time. (The CTD rosette is towed slowly behind the ship while a winch operator moves it up and down like a yo-yo, thus, "tow-yo.") Value-added data products of all data types were also sent to shore daily, which allowed scientists to make informed decisions about where to explore in greater detail with *Little Hercules* and *Seirios*.

In all, over 60,000 square kilometers were mapped over the rift, 400 linear kilometers of CTD tow-yos were collected, and 12 ROV dives were conducted. At least 20 distinct hydrothermal water column anomalies were found, and new theories about larval dispersal and hydrothermal habitat turnover due to eruption and venting activity were generated.

Hawaii, Necker Ridge – Law of the Sea

From July 31 to August 10, aboard the University of Hawaii's R/V *Kilo Moana*, research professor Jim Gardner, research associate professor Brian Calder, research scientist Briana Sullivan, CCOM data manager Paul Johnson, graduate student Garrett Mitchell, and 2010 GEBCO student Hadar Sade steamed above the Necker Ridge, a volcanic formation off Necker Island in the northwestern Hawaiian Islands, as part of the Law of the Sea efforts.

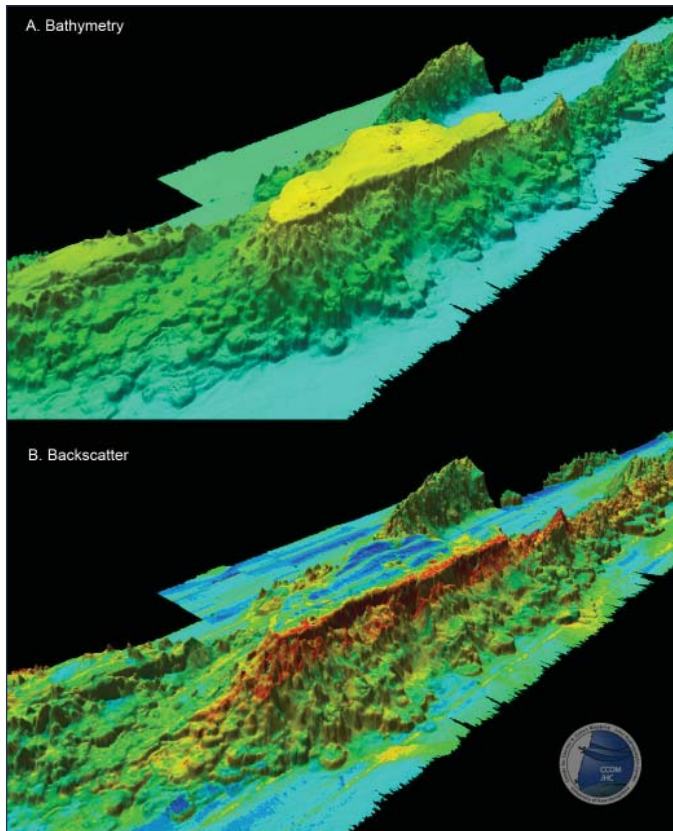


Research scientist Briana Sullivan prepares to launch an expendable bathythermograph (XBT) from the deck of *KILO MOANA*.

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Although the 650-kilometer long Necker Ridge was not initially identified as one of the regions where new UNCLOS bathymetric surveys were needed, subsequent U.S. State Department Extended Continental Shelf (ECS) Task Force discussions determined that Necker Ridge should be mapped. The cruise objective was to complete the mapping of the bathymetry of Necker Ridge that was begun in 2009 using the NOAA Ship *Okeanos Explorer*.

"It's a fascinating, 82-million-year-old geologic formation that's never been mapped before, and we found all kinds of strange things," reports Gardner.



Perspective bathymetry (a) and backscatter (b) views of southern Guyot of Necker Ridge. Vertical exaggeration 5x.

The *Okeanos Explorer* cruise mapped a feature near Necker Ridge called Horizon Guyot. A guyot is a flat-topped ridge indicating that at one time it was at sea level and got planed off by normal wave action. Notes Gardner, "But we don't know if the ridge formed deep down and then rose up to sea level where it got planed off, or if it was formed above sea level, settled and reached a static depth, got planed off, and then sank over time. Currently the top of Necker Ridge is from 1,800 to 3,500 meters below sea level."

The *Kilo Moana* cruise discovered several new flat-topped formations all at different depths than the Horizon Guyot, which

according to Gardner, means this region of the Pacific Plate has been rising and falling in ways geologists don't understand at all.

In six and a half days, *Kilo Moana* mapped 47,394 square kilometers. And, says Gardner, in addition to the data gathered in the name of the Law of the Sea, "Once again we have gone to an area that hadn't been mapped with modern techniques before and this information has provided the scientific community with a storehouse of new geologic information. The next step is to date it and piece together what its history really is."

Of the opportunity to take part in the mapping cruise, GEBCO alum Sade noted, "The theoretical knowledge I gained during coursework at CCOM enabled me to have in-depth discussions and a better understanding of some of the cruise's elements as well as a more efficient field experience. And it was my privilege to be able to work alongside Jim Gardner and Brian Calder—I had the rare opportunity to learn firsthand from two of the leaders in their respective fields."

Mid-Cayman Rise – Plate Tectonics

In August, also aboard the *Okeanos Explorer*, scientists including the OER's Meme Lobecker embarked on an expedition to the deepest part of the Caribbean Sea where a team of international scientists both at sea and on shore conducted interdisciplinary investigations of the Mid-Cayman Rise, an ultra-slow spreading center where two plates gradually move apart and upwelling magma creates new crust and the adjacent Cayman Trough.

The exploration focused on the oceanic core complexes that appear to dominate construction of the rift valley walls along much of the Mid-Cayman Rise and the inner wall of the Cayman Trough fracture zone immediately to the north. The cruise investigated the geology, marine life, and hydrothermal systems that these areas might host.

Says Lobecker, "The cruise was very dynamic. *Little Hercules* and *Seirios* were in the water for eleven to twelve hours a day diving on sites we had just mapped, then, overnight, we conducted mapping and CTD operations of new areas. The draped bottom backscatter data proved quite interesting to our shoreside geologists, who were able to determine from the data that a connecting ridge to the south provided clues about the geologic history of the Von Damm vent site." The latter vent site is named in honor of famed UNH chemical oceanographer Karen Von Damm who passed away in 2008.

Over the course of ten days, the *Okeanos Explorer* mapped the rift valley walls of the Mid-Cayman Rise and the northern wall of the Cayman Trough Fracture zone using the ship's deep-water multibeam sonar, and explored the water column for hydrothermal activity using a CTD rosette, *in situ* sensors, and shipboard dissolved methane analysis. They conducted detailed seafloor

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investigations using a two-body ROV capable of diving to 4,000 meters. During the expedition, live video of ongoing operations was streamed to shore where a team of scientists from the U.S. and the U.K. joined the expedition remotely through the use of telepresence technology.



Tom Weber (left) and Mashkoor Malik (right) get ready to deploy a CTD rosette aboard OKEANOS EXPLORER.

Gulf of Mexico – Gas Seeps

From August 22 to September 10, research assistant professor Tom Weber, research scientist Jonathan Beaudoin, graduate students Kevin Jerram and Maddie Schroth-Miller, NOAA physical scientist Mashkoor Malik, and NOAA Corps commissioned officer Glen Rice, conducted tests aboard the *Okeanos Explorer* in the Gulf of Mexico using the ship's multibeam sonar to map and detect gas seeps in the water column.

Working jointly with other scientists and technicians from NOAA's Office of Ocean Exploration and Research and the Bureau of Ocean Energy Management (BOEM), Weber and colleagues mapped more than 17,000 square kilometers of the Gulf of Mexico. While multibeam is typically used to map the seafloor, in 2009 the *Okeanos Explorer* first displayed its potential to acoustically map the water column using multibeam during tests off the U.S. West Coast.

"This expedition confirmed earlier indications that multibeam technology provides a valuable new tool in the inventory to detect plumes of gas in the water column—especially in deep water," said Weber, chief scientist for the cruise.

Single-beam sonar systems have been used for mapping gas seeps, which are primarily methane, but multibeam provides a wide, fan-shaped swath of the seafloor and therefore attains much greater coverage. The ship's multibeam system produced data to make high-resolution maps of gas in the water column in depths ranging from 1,000 to 2,500 meters.

"This capability will help increase our knowledge of the marine environment, including the distribution of natural sources of methane input into the ocean and the identification of communities of life that are often associated with methane gas seeps," Weber added. Mapping gas seeps helps scientists better understand the ocean's methane fluxes, carbon cycle, and deep-water marine environments.

The Gulf of Mexico is known to have numerous gas seeps, and data collected by multibeam should prove valuable to researchers planning further studies of the seeps and their effects on the marine environment.

According to Malik, who served as expedition coordinator for the mission, "The use of the multibeam during this mission confirms its effectiveness at detecting deep gas seeps over a wide area, and may lead to extending NOAA's water-column mapping capabilities."

Fairweather in the Arctic – Navigation

NOAA Ship *Fairweather* is the agency's Arctic mapping vessel for surveying areas designated critical to navigation as maritime transportation and infrastructure start moving further north. In early July, *Fairweather* departed Kodiak, Alaska on a mission to conduct hydrographic surveys in remote areas of the Arctic where depths have not been measured since before the U.S. purchased Alaska in 1867. NOAA will use the data to update nautical charts to help mariners safely navigate this important but sparsely charted region, which is now seeing increased vessel traffic because of the significant loss of Arctic sea ice.

For two months, *Fairweather* conducted hydrographic surveys covering 293 square nautical miles of navigationally significant waters in Kotzebue Sound, a regional distribution hub in north-western Alaska in the Arctic Circle.



CCOM/JHC grad student Kevin Jerram adjusts the position of a calibration target below OKEANOS EXPLORER's EK60 fisheries echosounder.

CCOM graduate student and NOAA senior survey technician Tami Beduhn was aboard her former ship and reports that after establishing horizontal and vertical control stations, data acquisition began on the main channel that shipping uses to provide supplies to the town of Kotzebue. Due to the extremely

shallow nature of the survey area, three of *Fairweather's* hydrographic launches were used for much of the survey. Two launches ran dual acquisition of hull-mounted sidescan and multibeam, while the third launch collected only multibeam.

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Together these were used to define the shoalest extents of the survey. *Fairweather* was also towing sidescan and collecting multibeam simultaneously offshore.

"I've had the opportunity to work on both NOAA Arctic surveys including the Bering Strait in 2010 and now Kotzebue in 2011," notes Beduhn. "Working in the Arctic has its challenges, as the faculty and students who have traveled aboard *Healy* have discovered, and I look forward to continue sharing my Arctic expertise with *Fairweather* as their new acting chief survey technician in the coming year. Field season 2012 has *Fairweather* traveling back to the Arctic to survey the area surrounding Red Dog Mine North of Kotzebue."

The city of Kotzebue, located on the shores of Kotzebue Sound at the tip of Baldwin Peninsula, serves as a supply hub for eleven Arctic villages and cannot currently accommodate deep draft vessels. Those vessels must now anchor 15 miles offshore, and cargo is brought to shore by shallow draft barges. This summer's survey will also address a request for bathymetry to support navigation and installation for an offshore lightering facility used for heating and fuel oil. An up-to-date NOAA chart, using data acquired from surveys with modern high-resolution sonar technology, can improve the efficiency and safety at this important location.



Canadian icebreaker AMUNDSEN sails behind an iceberg while preparing for the iceberg mapping mission.

Canadian Arctic – Iceberg Mapping

Beginning in July, the Canadian Ice Service (CIS) conducted their first ever under-iceberg AUV-based mapping initiative and CCOM research scientist Val Schmidt was aboard Canadian icebreaker *Amundsen* as part of the team. CIS's mission is to provide the most timely and accurate information on ice conditions in Canada's navigable waters by providing radar imagery, ice bulletins, tracking of icebergs, modeling, ice coverage graphs and a host of other products to support activities such as tourism, shipping, commercial fishing and the oil and gas industry.

Schmidt notes that the goal of this specific mission was to map the same iceberg twice—early and again late in the summer

season. Calculations of ice volume and roughness from the data would help forecast models of iceberg melt and scour.

The team embarked aboard the *Amundsen* on July 18, after mobilizing the entire effort in just over two months. The AUV was operated in an inverted position to allow for proper orientation of the sonar, and was on a tether to allow for recovery of the AUV in the event of mission abort.



Iceberg mappers; from left: Val Schmidt (CCOM/JHC), Alexander Forrest (UC Davis), and Andrew Hamilton (UBC Vancouver).

Because of the mission's fast-track schedule, the iceberg found for the study was far larger and deeper than ideal, and the depths required for operation, exceeding 120 meters, were too deep for AUV operations with the tether.

Nonetheless, a ship-based EM3002 dataset combined with ground penetrating radar (GPR) measurements, aerial photography, and the choice of a tabular or flat-topped iceberg, provided an adequate data set for volume and roughness estimates.

The iceberg was tracked with GPS/Iridium beacons through July and August. It disintegrated almost entirely in September thus scuttling plans to revisit the berg in October to make follow-up measurements. However, in an effort to resolve issues from the July cruise leg, CIS enlisted the AUV team to attempt a second try at under-iceberg mapping on a different berg located in October.

Says Schmidt, "Our second mission was successful and we collected several kilometers of under-iceberg data from depths up to 65 meters. This will be very useful with respect to future attempts."

Whale Tagging, Seafloor Characterization, and Ground-fish Habitat Mapping

Rounding out the year's efforts were a series of smaller cruises conducted by Colin Ware, Shachak Pe'eri, Jodi Pirtle and Tom Weber, respectively.

In June, Ware, director of CCOM's Data Visualization Lab, was aboard the *R/V Auk* out of Scituate, MA and, in August, was on a dive boat off Santa Barbara tagging whales as part of his ongoing effort to help analyze the underwater behavior patterns of whales. The Scituate cruise, now in its eighth year, continued his participation in a study of humpback whale foraging behav-

Where in the World? (cont.)

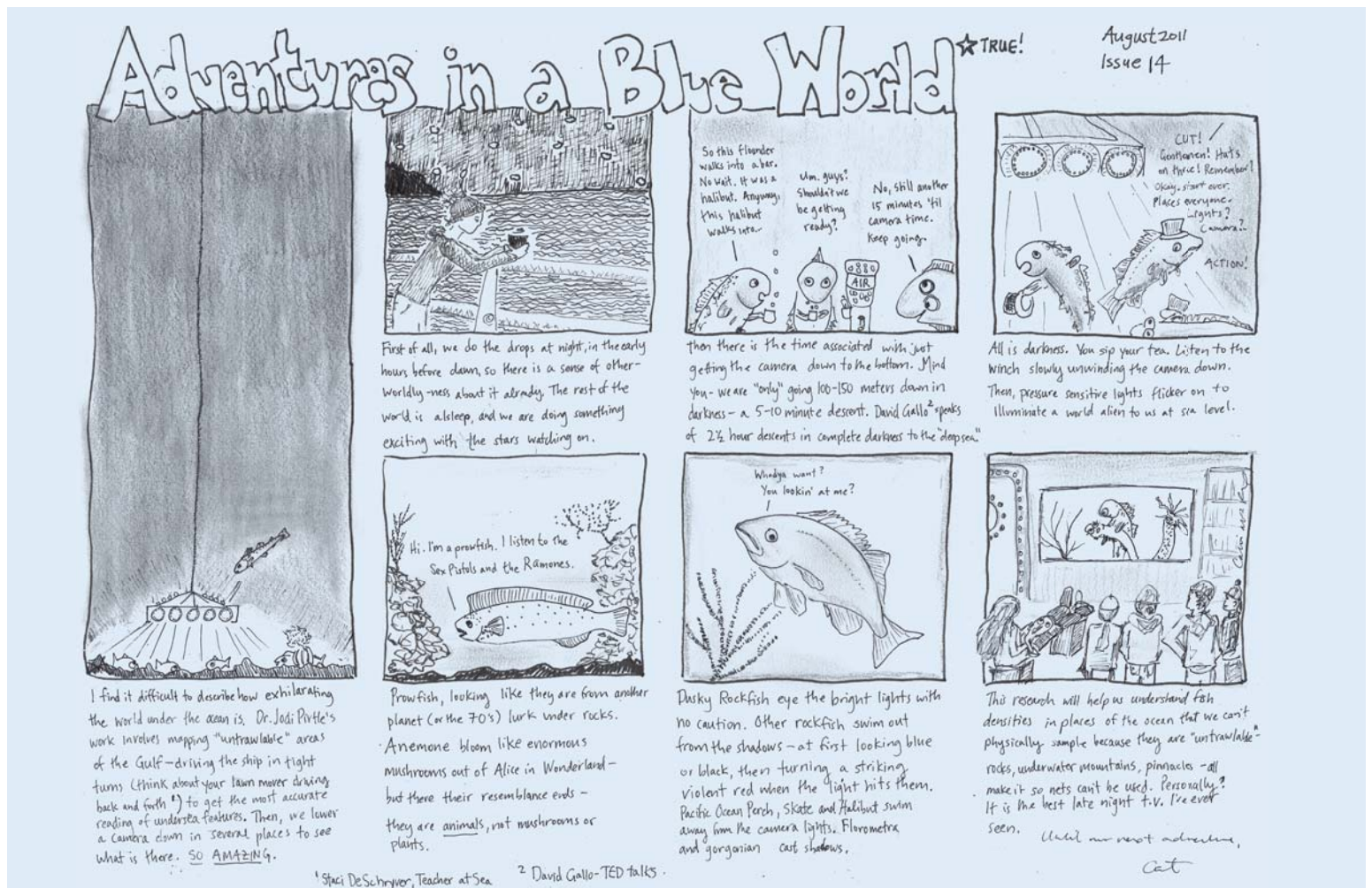
ior on Stellwagen Bank. The Santa Barbara cruise was part of the SOCAL Behavioral Response Study to investigate the impact of naval sonars on marine mammals with an emphasis on blue whales. Ware's TrackPlot visualization and analysis software has become a key tool for these studies.

Research assistant professor Pe'eri took research cruises from Gerrish Island, ME to Plum Island, Mass. on the R/V *Cocheco* from the end of June through early October as part of his on-going effort to relate seafloor character (geology, biology, etc.) to optic remote sensing observations (lidar, hyperspectral imagery).

As part of an acoustic-optical inter-comparison between multibeam/interferometric sonar backscatter to airborne lidar bathymetry (ALB) intensity, underwater video measurements were made using the CCOM Optical Collection Suite system. The study goals were to relate acoustic backscatter to ALB intensity based on the sediment type and to create a seamless thematic map of seafloor characteristics. For purposes of ground truthing,

underwater imagery and grab samples collected in 2009 from more than 200 stations in the same sampling area were used. According to Pe'eri, the combined ground truth and imagery shows that the seafloor in this study area is composed of fine and coarse sand, gravel, and rocky outcrops. These results correlate well with the backscatter imagery.

Postdoctoral research associate Pirtle and Weber are collaborating with the NOAA Alaska Fisheries Science Center to map areas of the Gulf of Alaska seafloor using the Simrad ME70 MBES. Aboard the NOAA vessel *Oscar Dyson* in June and again July-August, they used acoustic-derived seafloor parameters and remote video to characterize groundfish habitat and identify locations where traditional stock assessment survey methods using bottom-trawling may or may not be successful. According to Pirtle, this research contributes to NOAA's mandate to identify and describe Essential Fish Habitat for harvested species and develops alternative stock assessment methods for fish populations associated with rugged seafloor topography. ↓



NOAA Teacher at Sea, Catherine "Cat" Prenot Fox, was aboard OSCAR DYSON this summer with postdoctoral research associate Jodi Pirtle. Cat drew this amazing cartoon to illustrate Jodi's research. [Adventures in a Blue World. Issue 14. Cathrine Prenot Fox, 2011.] To see more of Cat's cartoons and read her observations of Jodi's work, visit <http://blueworldadventures.blogspot.com>.

In an effort to get to know some of our newer staff members, we asked Adam Skarke and Dan Trefethen a few questions. Adam is a Physical Scientist with the NOAA Office of Ocean Exploration and Research and Dan is CCOM's new Administrative Assistant.

Adam Skarke

Tell us about your background and research interests.

When I was a child I lived on a sailboat in the Caribbean Sea with my family for about three years. That experience instilled in me an early passion for ocean and coastal science as well as predilection for life at sea and adventures abroad. I attended high school in central Texas where I started my marine science career in earnest with a summer job counting foraminifera shells through a microscope as an intern at the University of Texas. I subsequently received my bachelor's degree from Colgate University in upstate New York where I majored in geology and conducted research on coastal sediment transport in Eastern Lake Ontario.

I earned my masters degree at the University of Delaware, where my research was focused on developing methods for acoustic characterization of heterogeneous seafloor sediments in the Delaware River Estuary. Upon completion of my master's degree I remained at the University of Delaware for my Ph.D. My doctoral work was focused on field observation and quantification of sediment transport processes in coastal and estuarine environments subject to combined wave and tidal current forcing. While in graduate school, I was heavily involved in the development and operation of autonomous underwater vehicle (AUV) systems. In the course of my graduate research, I was lucky enough to conduct research and AUV fieldwork all over the world, including the Black Sea, Caribbean Sea, Tasman Sea, Aegean Sea, Mediterranean Sea, and numerous locations in the Atlantic and Pacific Oceans. In some of this work I had the good fortune to work closely with Larry Mayer and Val Schmidt who both led me to my current position as a scientist with the NOAA Office of Ocean Exploration and Research. I have been at CCOM since August and very much enjoy my new position because it allows me to combine my research experience in ocean mapping with my passion for exploration in order to bring new and exciting discoveries to the scientific community and the public at large.

Where are you originally from?

I am originally from Austin, Texas.

What did you want to be when you grew up?

For quite a while I wanted to be an architect. After that I wanted to be a sea captain, but I finally settled on oceanographer.

Favorite holiday and why?

Christmas, because I get to see my family.

Favorite vacation spot?

Anywhere off the beaten path. I enjoy exploring new places and finding uncommon adventures.

What is a place in the world you've never visited but would like to see some day?

The Patagonia region of Argentina and Chile, including Tierra del Fuego.

Favorite ice cream flavor?

Mint chocolate chip.

Favorite movie or TV show when you were a kid?

The Indiana Jones movies. ⚓

Dan Trefethen

Tell us about your background and interests.

What a difficult question this would be for Proust. I grew up around the seacoast and my high school days largely consisted of making short movies with friends, as some are prone to do at that age. This led me to assume that I'd want to study Film in college, which I sort of did at UNH under a Communication Arts major. While completing my bachelors, I started to be drawn away from my major subject of study to a wider interest in English and language in general. I sort of became a heavy reader in the process.

I've just recently begun to realize that I'm developing quite a fascination with academia and universities. They are like miniature empires, but with grants.

I have very little background experience with Ocean Science, however I can swim and I have been on both a boat and a ship. And I do know that port means right and starboard left... oh, no wait.

Where are you originally from?

Dover, NH.

What did you want to be when you grew up?

I think my desired career changed with every birthday I had, which has remained consistent. But if I think about it, I believe I largely wanted to be a private detective. Odd.

Favorite holiday and why?

I guess Thanksgiving—it's a pretty easygoing day.

Favorite vacation spot?

London, England, I think is my favorite.

What is a place in the world you've never visited but would like to see some day?

Moscow and St. Petersburg. I'd have to learn a little bit of the language first, and figure out how to work a samovar.

Favorite ice cream flavor?

I worked at an ice cream stand in the summer of 2008—it was pretty fun, but I can't eat ice cream anymore.

Favorite movie or TV show when you were a kid?

Aladdin—I think I wanted to be a thief for a while after that. Or a genie. ⚓



New CCOM members Adam Skarke (left) and Dan Trefethen (right).

Xavier Lurton

CCOM has the privilege of hosting Visiting Scholars from around the world. Dr. Xavier Lurton has been with us since August and will return to his life in France in March.

Tell us about your background and research interests.

I have been in the acoustics domain for a long time now. It all began in 1976 when, after getting a Master's degree in Physics, I specialized in Applied Acoustics. Three years later, I got a Ph.D.—about the acoustics of brass musical instruments—at Université du Maine (not the UNH neighbor, this is actually in Le Mans, France). Then I spent two years of National Service as a Physics high-school teacher in Ivory Coast. Back to France, I was hired by a company manufacturing sonars for naval applications, in Paris. I worked there for eight years, as an R&D engineer specialist in underwater propagation and sonar system performance.

These were very exciting and intensive training years for me, the environment was indeed challenging, and I really learned a lot there. However I was expecting to work in a more open and free environment and to approach more diversified application topics—and this is not exactly what the military-industrial complex normally offers you. Also, living in Paris with three children was indeed becoming acrobatic! So I was very happy to be hired by Ifremer, where an underwater acoustics activity was starting in Brest. This proved to be really a great opportunity for me (it was a bit more difficult for my wife who lost her job, but the funny thing is that she has since been hired by my previous employer in their Brest branch, and she is now making more money than me!).

In my Ifremer position, I could address all the various topics of sonar applied to oceanography: echosounding, fisheries, underwater data transmission and positioning, ocean tomography, etc. Much was to be done since the acoustic team was then rather embryonic. A very appealing side of the job was that I had to address all aspects of a given technical problem, from the fundamentals and theory to the system engineering, the data acquisition at sea and the processing. This is really a very exciting—and challenging—aspect of working as an engineer in this type of academic institute. Also, I happened to be at a good time and place for participating in the development of sonar techniques for seafloor mapping that has occurred since the 1980s.

Today, I concentrate almost exclusively in this domain, although I have to keep updated about the various sonar topics addressed in oceanography activities. Most of my personal research activity (and as a Ph.D. advisor) over the last few years has been about signal processing for bathymetry, and sonar performance evaluation (not so far from my beginnings, actually...). I have to dedicate much of my



Xavier Lurton poses (fittingly) in the sonar room of the USS ALBACORE.

time to projects linked to the oceanographic fleet equipment (involving many contacts with manufacturers), and the management of our team of acousticians. In parallel to my engineering work, I have been teaching (at small scale, but very regularly) in French universities for about 20 years—the result being that I finally was asked to publish my course notes as a book. I have been in touch with Larry for quite a while now, and he invited me several times for a visit—first at UNB then at UNH. After some failed trials, I could finally make it—hence my presence at CCOM for 6 months as a visiting scholar.

Where are you originally from?

I was born in Bordeaux, France, where my parents both originate from. However, with my father being in the Navy, I spent most of my school and University years in Brest—so I feel equally at home in both cities.

What did you want to be when you grew up?

I successively wanted to be a sailor (like Dad), a musician (also a family affair), and an engineer (the way the world was explained in the physics lessons at high school was so fascinating...). So I first specialized in musical acoustics, trying to work altogether as a semi-professional musician. After my Ph.D., I found it easier to go for something more stable and realistic, and went for a job in underwater acoustics. As a result, 30 years later I am still in the field of sonar engineering, and spending a significant part of my time at sea. And since I am still active as an amateur musician, the final compromise between my various initial aspirations is not so bad.

Favorite holiday and why?

The classical summer holiday. The weather in Brest may become seriously rainy in July (!), and it's good then to go South (see below).

Favorite vacation spot?

My perfect vacation (it actually happens every year) is returning to fundamentals at my family's place, in the Deep South-West of France: long sunny days just playing music, reading, enjoying good food and wine, riding my bike in the vineyards or along the Canal du Midi... Ideally for two weeks—one is a bit short, and three make it too hard to go back to real life.

A place in the world you've never visited but would like to see some day...

There are many of them! The top of the list could be Brazil, Russia, Vietnam...

Favorite ice cream flavor?

Normally Pistachio-Vanilla. But I've not tried yet the local Lobster Ice Cream.

Favorite movie or TV show when you were a kid?

An embarrassing one! Hard to believe today, but I was raised with absolutely no TV and practically no cinema! I've become a big cinema fan since then, but I still live without any TV. ⚓

Know the Coast Day 2011

On October 15, 2011, the 2nd Annual Know the Coast Day outreach event was held at the Chase Ocean Engineering Laboratory, the Coastal Marine Research Facility, and the Jackson Estuarine Laboratory. Hundreds of visitors got a chance to see and experience some of the exciting marine research happening in the Seacoast region.



Here in Chase, visitors tried out their driving skills with a SeaPerch ROV, built LEGO models to float in the wave tank, and learned about

research buoys, ROVs, and ocean acoustics. Due to some very fortunate timing, the telepresence console was buzzing with activity as the E/V *Nautilus's* ROV *Hercules* dove in the Atlantic Ocean's Gorrige Bank off the coast of Portugal.

It was a great day. Many thanks to all who helped out!



Sustainability Updates

Maureen Claussen, Chase Sustainability Steward

UNH Energy is pushing for a campus-wide policy in 2012 that identifies the target heating temperature as 68 degrees F, and the target cooling temperature as 78 degrees F. Of course, this may be easier to attain and manage in some buildings than others but the goal is to save money and reduce UNH's carbon footprint by not aiming for 72 degrees year round. UNH Energy also encourages people to call about temperature problems rather than using space heaters.



Users of the Keurig machine should consider investing in a refillable K-cup that fits our model (#B200). This will help minimize the waste of disposable cups. Check out the CCOM Wiki page on Sustainability (<http://wiki/index.php/Sustainability>) for links to sites where you can buy these items and some ideas for repurposing the used cups—seed starters anyone?

SeaPerch

Students from the Oyster River Middle School spent two days in November using the engineering tank in the Chase Ocean Engineering Laboratory as part of their SeaPerch Challenge.



The SeaPerch Program is an underwater robotics program that trains teachers and students to design and build underwater ROVs from kits. The ROVs are then launched in a pool and perform tasks to test their design and performance.

An obstacle course was set up in the deep tank for the ROVs to drive through, and items were placed at the bottom of the tank to simulate capping underwater wells. More student groups will be using the tank for SeaPerch in the spring, come on down to take a look.



New Awards at CCOM

The following grants were recently awarded:

Jonathan Beaudoin and Paul Johnson - National Science Foundation, "Collaborative Research: Optimizing Multibeam Data Acquisition, Operations and Quality for the US Academic Research Fleet"

Larry Mayer - General Bathymetric Chart of the Oceans (GEBCO), "Indian Ocean Project"

Colin Ware - Oculus Info, Inc., "Investigation of Motion Cues for Linking Elements of Complex Visual Displays"

IT Updates

CARIS releases HIPS and SIPS 7 64-bit

This past September, CARIS released the 64-bit version of their venerable HIPS and SIPS application. The new version provides users with the ability to handle larger multibeam sonar datasets, and the capability to process them even faster. The new version requires Windows 7 64-bit so, if you would like to have the software installed, or you are interested in upgrading your workstation to Windows 7, please contact the CCOM IT Helpdesk.

QPS and IVS 3D provide QINSy licensing to CCOM

Thanks to the merger of IVS and QPS, CCOM's industrial agreement with IVS 3D now includes licensing for QINSy hydrographic management software. Several hardware keys are available for checkout from the IT Group, and a 5-seat license server will also be online in early December.

MATLAB DCS

The Center purchased licensing for MATLAB Distributed Computing Server software late last year. The software runs on the Center's cluster, currently consisting of seven servers with two quad-core CPUs and 8GB of RAM each. With MATLAB DCS, you can harness up to 56 CPU cores and 56GB of RAM for parallel processing of large datasets. Internal testing has shown that using MATLAB DCS can reduce processing time by over 98%.

Learn more on the CCOM Wiki, http://wiki.ccom.nh/index.php/MATLAB_Distributed_Computing_Server or contact Jordan Chadwick (jchadwick@ccom.unh.edu) for more information.

High Bay Updates

Andy McLeod, King of the High Bay

Phoenix

Team NOAA ROV is back at work and will be actively re-engineering the Phoenix through the next two to three months. Dave would be glad to give you a general description of the work. Make him aware that you will be publishing.

Sand Filter

The main sand filter for the engineering tank was replaced at the beginning of December. Good for maintenance, bad for excitement.

Squirrel!

Occasionally a squirrel gets in.

Lights! Camera!

The now defunct aquaculture program has provided us with some awesome underwater lighting. It will be used for all future projects to enhance the filming experience. Also, we borrowed three cameras from Ken Baldwin and a video combiner to project underwater activity on the screen. Safe and more inclusive.



Replacing the sand filter.

Administrative Notes

2012 Holidays

Planning a vacation? The 2012 USNH Holiday Calendar is posted at <http://www.unh.edu/hr/holidays.htm>.



Some winters are worse than others.

Winter Emergency and Storm Information

Wondering if it's a snow day? Check www.unh.edu/unhedu-top/emergency-and-storm-information for notices about curtailed operations on the UNH Durham campus. Use the link to sign up for UNH Alerts so that you will receive notices on your mobile device or by email. You may also call 603-862-0000 for the latest information.

CVS Caremark

If you are enrolled in a Harvard Pilgrim medical plan through USNH, you should have recently received a new prescription ID card from CVS Caremark. It is important that you bring your CVS Caremark card with you the first time you fill a prescription in 2012 so that your pharmacy can update your information.

More information can be found on the CVS Caremark website: <http://www2.caremark.com/usnh/>

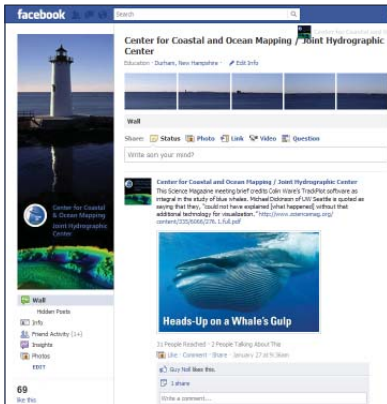
Lands' End Store

Many new items have been added to our CCOM Lands' End store! All items ordered through this site will have the CCOM logo. http://ces.landsend.com/unh_ccom

Out of Office

All students, faculty, and staff should notify their supervisor when they are out of the office. Also, please notify the administrative staff by emailing admin@ccom.unh.edu. The admin email address can also be used to request visitor parking spaces and make meeting room reservations.

Facebook



Check out CCOM/JHC's new organization page on Facebook! It's a great place to find articles, notices, pictures, and relevant news from UNH, our NOAA partners, and the hydrographic community.

If you have pictures, videos, news, or other items you'd like to post, please contact Colleen, colleen@ccom.unh.edu.

<http://www.facebook.com/CCOMJHC>

Flickr



CCOM/JHC's Flickr site now has more than 1,200 images. If you need an image or are just wondering what happens to all of the pictures we take at events, it's a good place to start. All of these photos are downloadable and available for your use. Please use the credit provided or credit CCOM/JHC.

If you have CCOM/JHC images that you'd like to share on Flickr, please contact Colleen, colleen@ccom.unh.edu.

http://www.flickr.com/photos/ccom_jhc/

Coming Soon...

The new CCOM/JHC website will be soft launched on February 17. "Soft launch" means that it will be visible only to folks on the CCOM network. The website team has worked long and hard to reach this point and are very excited to share their work with everyone.



Please take some time to browse through the site. Check your bio; review your publications. Your feedback and suggestions are welcome and will help ready the site for the public launch.

People News

Congratulations to **Kurt Schwehr**, who has started his new job at Google as a GIS Data Engineer working on Google Ocean. Kurt will continue some of the work that he started when he was at

Google this past summer—global bathymetry processing for the oceans and lakes of the world and vector data (including expeditions, marine protection, ship wrecks, etc). To facilitate these projects, he will work directly with institutions to improve the process of getting data into the Google systems. This will better showcase the work of researchers in a wide range of research areas including, but not limited to, oceanography, geology/geophysics, biology and energy. Best of luck Kurt!



Congratulations to Affiliate Assistant Professor **Margaret Boettcher** and her partner Linda Kalnejais on the birth of their baby boy, Jason Peter Kalnejais Boettcher. Jason was born on November 30.

Student News

Carlo Lanzoni successfully defended his Master's thesis, "Field Calibration Methodology for a Multibeam Echo Sounder Using a Split Beam Sonar System and a Standard Target," on December 14th. Carlo will continue his work here at CCOM as a Research Project Engineer.

On December 16th, **Anastasia Abramova** defended her Master's thesis titled, "Comparison and Evaluation of Publicly Available Bathymetry Grids in the Arctic." Nastia will be volunteering at the Seacoast Science Center and taking part in an *Okeanos Explorer* cruise in February before going home to Russia to join the Geological Institute Russian Academy of Sciences.

Jorge Alvera Alvarado presented his Master's research, "Acoustic Backscatter Processing for the Navy of Ecuador," on December 16th. Jorge and his family have returned to Ecuador where he will resume his work with the Ecuadorian Navy.

Tami Beduhn presented her Master's research, "A Case Study of Robust Bottom Detection and Eelgrass Mapping in Great Bay, New Hampshire," on December 16th. Tami has rejoined her crew aboard the NOAA Ship *Fairweather* in its home port of Newport, Oregon. Read more about Tami in the Student Profile on Page 12.

Student Profile - Tami Beduhn

Tami completed her M.S. in Earth Science: Mapping Option in December and is now in her new position with NOAA in Newport, Oregon. Before she left, she took the time to sit down and answer a few questions.

While we're very sorry to see you go, you must be excited for the next step. Where are you off to now? What will you be doing?

Well, as you mentioned, I'm headed to Newport, OR to meet back up with my ship *Fairweather*. NOAA recently relocated the Marine Operation Center—Pacific from Seattle, WA and this will be my first opportunity to experience life in *Fairweather's* new winter home. While I was here at UNH, my boss and CCOM graduate, Lynn Morgan, decided to take a new position working with Oregon State's Glider Program. Therefore, I am excited to be returning home as the new Chief Survey Technician of *Fairweather*. This will be a large leap for me but, after grad school, I think I'm up for the challenge.



Tami on Little Diomed Island.

So how much time do you anticipate spending at sea? Where will you be mapping?

Great question because the coming field season has a big question mark on the number of sea days which will be allotted to all ships in the NOAA fleet. *Fairweather* is currently scheduled to head North to Alaska in the beginning of May with projects near Ketchikan, Kodiak, and a big one (nearly half the planned season so far) up in the Arctic surrounding the Red Dog Mine and DeLong Mtn. Terminal. We survey all summer until September right now and, depending on the 2013 budget, we'll either head back south to Newport, OR in September or November if we're awarded additional sea days.

When you look back on your time here at UNH, what are your favorite memories?

Oh wow. I'd have to say that all of my favorite memories revolve around the people I have met and worked with here. The study nights in the Admiral's Conference Room, long rides on the way to New Castle, cold rainy days out on Great Bay, and evenings of Euchre were all very memorable. However, I will most fondly remember the laughs and triumphs over my research struggles and the people who were patient enough to work with me.

One of the perks of going to sea must be the great locations you've had the chance to visit, which ones stand out?

Well, during my time with NOAA, I've only been on an Alaskan survey ship. That said, I've been to nearly every major/minor port across all of Alaska from Sitka, Seward, and Cordova, some of my favorites in central and southeast Alaska, to up and around the Aleutian chain including Kodiak, Dutch Harbor, Nome and Kotzebue. The project area which stands out most though would have to be *Fairweather's* Survey of the Bering Strait and Little Diomed Island. This was my first time working in the Arctic and, although there were countless bad weather days, difficulties, and unknowns, I remain impressed with how the crew came together to exceed everyone's expectations and complete the survey. We also took part in a cultural exchange with the native community on Little Diomed. Elders of the tribe shared a meal aboard the NOAA ship while also receiving a tour of the vessel. In exchange, *Fairweather* crew members were invited to an evening of native dancing and mingling with the islanders. Crew were also at liberty to hike the island and enjoy the beauty of this rarely explored location in the Bering.

Any tips for incoming students?

Start your research now! ASAP! It's never too early!

How can we keep in touch with you?

That's an easy one! As I am still with NOAA, my e-mail will remain the same: Tami.Beduhn@noaa.gov and I look forward to continuing collaboration with CCOM students and faculty from the field. ⚓

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Images are provided by the Center, unless noted otherwise. This issue's banner graphic is bathymetry of the Mendocino Ridge West Block, courtesy of Jim Gardner and the 2009 *Okeanos Explorer* Law of the Sea cruise.

We welcome comments and suggestions.