

Deep-C Consortium

Studying deep sea to coastal communities
in the northeastern Gulf of Mexico

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Learn more about us on the web!
www.deep-c.org



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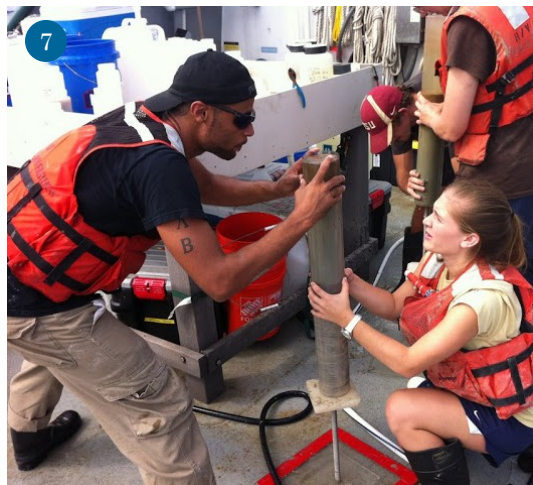
Deep-C Members Institutions: Florida State University (lead), Dauphin Island Sea Lab, Georgia Institute of Technology, Naval Research Laboratory at Stennis Space Center, Norwegian Meteorological Institute, SAIC, University of Miami RSMAS, University of South Florida, University of West Florida, Woods Hole Oceanographic Institute.

IMAGES FROM THE FIELD

Fall 2012/Winter 2013



1) Teachers participating in an all-day workshop on building water temperature sensors. 2) Researchers from the University of West Florida and Woods Hole Oceanographic Institution scouring the beaches immediately after Hurricane Isaac. 3) A first grade class with their gyoatoku fish print wall hanging, a project coordinated by Deep-C educators. 4) Deep-C science director Dr. Felicia Coleman giving at talk at a science cafe on "The Secret Life of Fish." 5) A cactus worm (priapulid) found in a sediment core collected during a research cruise. 6) A fiber-optic drift camera going over the stern to begin a survey. 7) Researchers sectioning a sediment core.



The Deep-C Consortium is investigating the environmental consequences of petroleum hydrocarbon (oil) on living marine resources and ecosystem health in the northeastern Gulf of Mexico. Consortium members seek to increase understanding of the fundamental physical, chemical, and biological connections between the deep sea, continental slope, and coastal waters and their linkages to critical habitats and ecological functions.

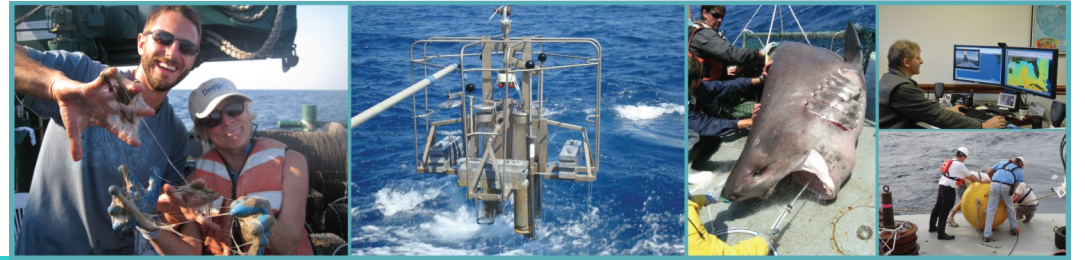
More than 100 scientists and students at 10 academic and research institutions in the United States and Norway are participating in Deep-C. Activities include mapping the sea floor; analyzing water and sediment samples; studying how oil-related toxins may affect wildlife; and determining how currents and other ocean processes transport oil.

Data is collected by hand, boat, plane, and satellite and is analyzed and used in model studies to support improved responses to possible future oil spills. Through computer simulations of possible oil spill scenarios, Deep-C is producing projections of changes in ecosystem services that can support enhanced decision making and forecasting of potential socioeconomic outcomes.

Deep-C seeks to engage students, policy makers, and the general public in the process of scientific discovery and to encourage a sense of stewardship for the Gulf. Our outreach efforts include experiential internships; educational workshops; special events; multimedia production; and social networking.

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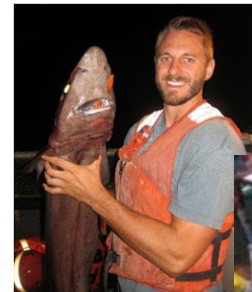
CHRONICLES

"We've been experiencing remarkably fair weather thus far. Clear days, cool nights, and wind no higher than a few knots. Except for the occasional fishing vessel during the first day or so and tankers thereafter, we haven't seen many other boats out here."

— Dr. Felicia Coleman
(Excerpt from cruise blog)

Deep-C "Voices from the Field" Sharing science and discovery in the northeastern Gulf of Mexico

"Voices from the Field" is Deep-C's blog (web log) set up to inform and educate scientists, students, policy makers, and members of the general public about exciting developments taking place in the Gulf of Mexico. The site is host to entries made by researchers participating in the Deep-C Consortium, a long-term, interdisciplinary study of deep sea to coast connectivity in the northeastern Gulf.



Dr. Felicia Coleman, FSU, blogged about a Taiwan gulper shark, *Centrophorus cf niaukang* (at left with Chris Malinowski) and a six-gill shark, *Hexanchus griseus* (below), brought aboard during a Deep-C ecology research cruise.

To read Deep-C's "Voices from the Field" visit www.deep-c.org

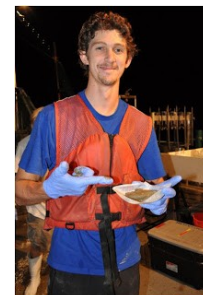


Also in this issue:

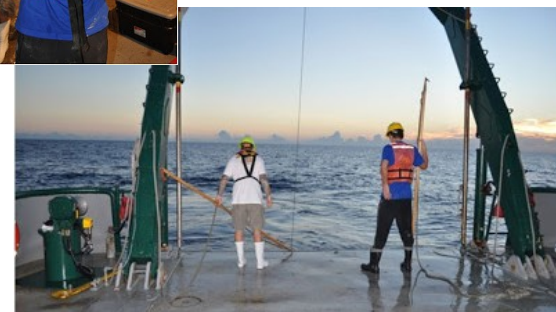
- First Annual Deep-C ROV Competition 2
- Studies of DeSoto Canyon and Shelf Demonstrate Upwelling During Hurricane Isaac 3

Facts about the Gulf...

- The Gulf of Mexico is an ocean basin roughly oval in shape — it measures approximately 1,600 kilometers from east to west, 900 kilometers from north to south.
- Almost half of the basin is shallow continental shelf waters. At its deepest, the Gulf is 14,383 feet (4,384 meters).



Will Overholt (left), a graduate student at Georgia Tech working in the Kostka Lab, blogged from an October 2012 research cruise on the RV Weatherbird II. Will was part of a team of Deep-C scientists investigating bacteria that live in the sediment at the bottom of the Gulf, particularly bacteria involved in eating oil from the Deepwater Horizon oil spill.



Posts by Dr. Ian MacDonald, FSU, (right) during research cruises have given blog followers the opportunity to see fieldwork up close and personal. One post documented the discovery of an unexpected patch of asphalt on Peanut Hill, which indicated natural oil seeps.



First Annual Deep-C ROV Competition Showcases Students’ Talent and Ingenuity

By Amelia Vaughan,
Ocean Science Educator

March 2012 — Last summer, the Dauphin Island Sea Lab (DISL) hosted teachers from around the state of Florida for a marine science and underwater technology workshop. Participants spent four days learning about Remotely Operated Vehicle (ROV) construction, as well as activities that they could implement in the classroom to enhance students understanding of buoyancy, basic engineering principles, basic circuitry and deep sea oceanography. They returned to their schools with building supplies and a mission — assemble a team of enthusiastic students who could take on the challenge of building their own ROV for a student competition in Spring 2013.

Months of hard work culminated with the first annual Deep-C ROV competition where six teams braved the cold weather to test their creations. The pool at DISL was transformed into "Mission Control" as each team had the opportunity to complete a series of tasks ranging from successfully navigating through a hoop to identifying



"Mission Control" a.k.a. the DISL Pool (Photo credit: Amelia Vaughan)

several marine species. After the first round the students had a chance to make adjustments and modifications to their ROV before jumping back into the pool for the second round.

After two missions, each team made a presentation describing their design process and what they learned as a result. Then they participated in a round of questioning by the competition judges. The winners were recognized during an awards ceremony Sunday afternoon. The team from Santa Rosa Christian School — the Subtropicals —

were victorious, making them the first winners in what will hopefully be a long tradition of Deep-C sponsored ROV competitions at the Sea Lab.

"We are very pleased with the outcomes of our first year of Deep-C activities. We had some fantastic and dedicated teachers to work with and met some amazing high school students" **Dr. Tina Miller-Way**, chair of Discovery Hall Programs for Education and Outreach at the Dauphin Island Sea Lab. "Students indicated that they really enjoyed the process of building their

ROV from scratch and testing it, as well as themselves, by putting it in the water and pitting it against other designs.

According to Miller-Way, post-event surveys demonstrated increased understanding of circuitry; concepts of hydrodynamics and buoyancy; the use of ROVs in marine research, industry and exploration; possible careers in these fields and an appreciation of effective teamwork. And if that wasn't enough, students, teachers and the DISL staff had a great time hosting the competition!



Congratulations to the Santa Rosa Christian School SubTropicals on their first place finish! (Photo credit: Tracy Ippolito)

Amelia Vaughan is an education and outreach coordinator for the Deep-C consortium. She is passionate about education and connecting students with Deep-C research!

Dr. Tina Miller-Way is Chair of Discovery Hall Programs for Education and Outreach at the Dauphin Island Sea Lab. The lab, located in southern Mobile County off Alabama's Gulf Coast, is well-known for their excellence in education and outreach programming. As a marine laboratory, DISL's mission encompasses marine science education, marine science research, coastal zone management policy and educating the general public through the Estuarium, Dauphin Island Sea Lab's public aquarium.

DISL's Discovery Hall Programs will hold another Deep-C ROV teacher workshop this summer, July 7-11, 2013. For more information, visit <http://dhp.disl.org/teachertraining.htm>



Lake Weir High School team members directing their ROV during the first mission. (Photo credit: Amelia Vaughan)

Studies of DeSoto Canyon and Shelf Demonstrate Upwelling During Hurricane Isaac

Deep-C Consortium Scientists Survey Ocean to Better Understand Movement of Tar Balls in Gulf Mexico

September 2012 — As Hurricane Isaac barreled toward New Orleans in late August 2012, a team led by University of Miami (UM) Professor and Deep-C Co-Principal Investigator **Nick Shay** was planning NOAA's P-3 aircraft missions to fly into the storm. Dr. Benjamin Jaimes and UM senior research associate Jodi Brewster and graduate student Ryan Schuster prepared and loaded 39 profilers into the plane. Their goal: to drop these profilers into the storm at optimum locations where they could collect measurements of ocean heat content, salinity and currents during the hurricane.

"We wanted to collect data from the DeSoto Canyon area where the Deepwater Horizon incident occurred, so we could capture the upwelling as it was occurring," said Shay, who is an expert on the Loop Current and regularly studies weather in this region. "We used operational products that we developed for NOAA's National



UM team during a pre-flight briefing with NOAA's flight crew at MacDill Air Force Base. (Photo credit: Jodi Brewster)

Environmental Satellite Data and Information Service (NESDIS) to study the warm and cold core eddy ahead of the storm to establish drop points and deploy three different types of devices that penetrate to depths of 4,500 feet."

The experiment was planned as a component of NOAA's 2012 Hurricane Field Program, coordinated by the Hurricane Research Division at the Atlantic Oceanographic and Meteorological Laboratory. Prior to Hurricane Isaac the team flew over the area and deployed 54 devices to collect baseline oceanic and atmospheric data over the shelf and shelf break. After the storm, the team worked with the flight crew at NOAA's Aircraft Operation Center located at MacDill Air Force Base to deploy another 67 probes and get a post-hurricane snapshot of the area tying the response from several research flights. The information from each of the flights is being analyzed by scientists, and for input into both research models that are being developed for Deep-C as well as operational models at forecasting centers.

"From previous hurricanes like Ivan and Frederic we knew this area was prone to upwelling, and deep sea responses to the events

taking place in the atmosphere. These areas have high humidity and strong surface wind activity which may lead to tar balls washing ashore – which may have the same chemical fingerprint as the oil spill. We are interested in this possibility, and the long term impacts it might have on the coastal ecosystem," said Shay."

Hurricane Isaac presents a unique opportunity to investigate that possibility. Since the Deepwater Horizon accident, Deep-C scientists have visited and revisited sites along the Gulf Coast that were affected by the oil spill. A team scoured the beaches as recently as one week before Hurricane Isaac, looking for samples of oil that have mixed with sand to create what are referred to as "sand patties." Immediately following the storm, those Deep-C teams led by Deep-C investigators **Dr. Chris Reddy** of the Woods Hole Oceanographic Institution (WHOI) and **Dr. Wade Jeffrey** of the University of West Florida, returned to the beaches and collected additional samples.

"Our intent," Reddy said, "is to determine if these post-storm samples contain oil from the Deepwater Horizon spill and, if so, if they are in fact a result of the upwelling and deep sea responses to

the recent hurricane." One of the ways the fate of the oil can be determined is to study an effect called weathering — that is, how oil that is discharged into the environment changes over time. Weathering affects the properties of spilled oil and according to Reddy, oil from the deep bottom is likely to have weathered differently than samples already on the shore prior to the storm that were simply unearthed or exposed by the winds and rain of Hurricane Isaac.



WHOI's Karin Lemkau collects a sample in Gulf Shores, AL just after Hurricane Isaac.

"We are doing a careful and prudent analysis of the samples found to determine if they are, in fact, Deepwater Horizon oil from the deep sea," Reddy said.

Dr. Lynn "Nick" Shay is a professor of meteorology and physical oceanography at the University of Miami's Rosenstiel School of Marine and Atmospheric Science (UM-RSMAS). He oversees the Upper Ocean Dynamics Laboratory.

Dr. Chris Reddy is a senior scientist in the Woods Hole Oceanographic Institution's Department of marine chemistry and geochemistry. Since April 2010, he has devoted most of his research efforts to studying the Deepwater Horizon oil spill in the Gulf.

Dr. Wade Jeffrey is a professor of biology at the University of West Florida (UWF) where faculty, staff, and students are active in marine ecology, fisheries, economics, tourism and oil bioremediation.



UM graduate student Ryan Schuster prepares and loads profilers into the plane.