Scientific Dream Team Conducts Rapid Response Research at Hercules Gas Blowout

It started with radio chatter about a gas rig blowout heard on a research vessel early Tuesday morning. A few days later an all-star science team from across the Gulf region sailed from Cocodrie, Louisiana on the R/V Acadiana to the Hercules site. The vessel was loaded with ocean drifters to track movement of surface waters around the rig and with equipment to collect time-sensitive samples of water, air, and sediment. Working with federal authorities, the research team received sampling access to within 500 meters of the rig.

A flurry of emails and phone calls on Tuesday turned into meetings on Wednesday. Researchers quickly generated real-time models to support plans for drifter deployments and sampling sites and obtained use of a vessel. On Thursday and Friday, teams loaded equipment into vehicles or hurriedly prepped them for express shipment and then travelled to Cocodrie and loaded the vessel. The first expedition left port on Saturday at 6 AM in bad weather and rough seas and sailed to the incident site. That afternoon and evening, despite challenging conditions, drifters were transmitting GPS signals of their movement and researchers began collecting water and sediment samples. The crew returned to port around midnight for rest and supplies. On Sunday evening the vessel left port again and science crews continued their work through Tuesday, successfully gathering important data.

This gas-well blowout represents a unique opportunity to document impacts of contaminants in a shallow water environment. The foresight, resourcefulness, and collaborative efforts of these quick-acting researchers should give the public, responders, and other scientists key information about the incident arena, at essentially its beginning, to better understand impacts as this event evolves.

Being part of the GoMRI science community played a key role in the success of this endeavor. "The GOMRI network – knowing the expertise of other GoMRI consortia and the proper people to contact – made it possible to assemble a scientific ‘dream team’ in short order," said Samantha Joye, a biogeochemist and microbial ecologist.
with the University of Georgia and science lead for the ECOGIG consortium, who spearheaded this effort.

The team collected time sensitive data to establish comprehensive biological, chemical, and physical oceanographic data sets to characterize the incident area very early on in the event. Specific accomplishments included:

• deployed 21 surface drifters around the rig;
• used real-time drifter data in models that guided sampling around the rig;
• collected water samples from eight stations (at multiple depths and at different distances from the rig), including areas not impacted (up-current) and potentially impacted (down-current);
• conducted 33 CTD casts and nine sediment core casts; and
• released drift cards in support of the GISR Drift Card Project.

Background on the Incident

In the early morning hours on Monday, July 23rd, the Hercules 252 rig owned by Walter Oil and Gas of Houston, TX blew out, spewing a mixture of gas, condensate, and possibly other hydrocarbons into the water and air. The rig is located about 55 miles south of the Louisiana coast. All workers on the rig were safely evacuated. Surface sheens periodically became visible and then dissipated at and around the blowout site. Later the rig caught fire and continued to burn until, as authorities believe, sand and sediment clogged the well, temporarily shutting off the gas flow. Responders then dug a relief well for a permanent plug.

The participating scientists and researchers are members of five GoMRI Research Consortia:

• Ecosystem Impacts of Oil and Gas Inputs to the Gulf Consortium (ECOGIG)
• Coastal Waters Consortium (CWC)
• Gulf Integrated Spill Response Consortium (GISR)
• Consortium for Advanced Research on Transport of Hydrocarbons in the Environment (CARTHE)
• Center for Integrated Modeling and Analysis of the Gulf Ecosystem (C-IMAGE)

CARTHE provided this image on July 26, 2013, 2:19:04 PM CDT. It shows suggested locations where researchers on R/V Acadiana should deploy drifters. Sites are in a circular pattern around the Hercules Rig with radii changing from 1 km to 10 km. Image credit: Edward Ryan and Tamay Ozgokmen (University of Miami and CARTHE)

Adapted from a longer article. Original article published here.

To hear more from the student researchers involved in the research, see this newsletter’s Community Interview on page 5.
Note from the Research Board Chair
Dr. Rita Colwell, University of Maryland and Johns Hopkins University

The link between public health and the oceans is important, but often poorly understood. Traditionally, there has been very little integration between the disciplines of public health and oceanography. A new field of “Oceans and Human Health” has emerged in the last decade that explores the potential direct impact of the oceans on human health in areas, notably global climate change, harmful algal blooms and contamination of marine waters and seafood\(^1\). The mission of the GoMRI is to improve society’s ability to understand, respond to, and mitigate impacts of petroleum pollution, with emphasis on the Gulf of Mexico. As the program completes its third year, understanding public health impacts of oil spills remains a key issue for GoMRI.

In July of this year, GoMRI invited a panel of experts to explore the intersection between public health, oceanography, and oil spill science. The goal of the meeting was to inform the GoMRI Research Board of ongoing research and future directions for investment related to public health impacts of oil spills, with a focus on the Deepwater Horizon event. Discussions during the workshop included consideration of and approaches to research in these areas, as well as the value of interdisciplinary research in solving public health problems associated with oil spills. A report from the workshop has been posted on the GoMRI website and will provide a framework for Theme 5 “Impacts of oils spills on Public Health” for the next RFP. The National Academies of Science has also acknowledged the importance of public health in its new Gulf Program, stating that their program will include human health, environmental protection, and issues related to offshore oil drilling, hydrocarbon production, and transportation.

GoMRI looks forward to working with the scientific community to foster cooperation between oceanographers and human health workers to improve future response to oil spills and related coastal disasters.


The GoMRI Research Consortia have been busy reaching out to all different forms of media.

Check out the radio, TV and Vimeo clips below!

**“Deep-water Disaster Three Years On”**
C-IMAGE was featured on Living on Earth, the weekly environmental news and information program distributed by Public Radio International and broadcast by 300 Public Radio stations. [https://soundcloud.com/living-on-earth/deepwater-disaster-three-years](https://soundcloud.com/living-on-earth/deepwater-disaster-three-years)

**“Scientists Studying the Impact of Oil Spill on Coral Reefs”**
The ECOGIG Media Day in July resulted in a news story by WLOX out of Southern Mississippi. [www.youtube.com/watch?v=UOtpxUM5nWc](http://www.youtube.com/watch?v=UOtpxUM5nWc)

**“Meet Bob the Drifter”**
Bob is one of the many important devises that collect data for CARTHE. [http://vimeo.com/77107411](http://vimeo.com/77107411)
Education Spotlight:
Summer Learning with the GoMRI Research Consortia

The summer of 2013 was a busy one for the GoMRI Consortia Education and Outreach Teams!

C-MEDS held a successful Summer Outreach Program, where 10 undergraduate students from Tulane and LSU conducted oil spill research, and helped plan a Science Day for a local summer camp. During Science Day campers had an informal discussion with outreach interns about college, science, and the oil spill. They also participated in five age-appropriate scientific experiments in a Tulane research lab.

C-IMAGE worked with the Oceanography Camp for Girls, a program at the University of South Florida College of Marine Science. Under the interdisciplinary umbrella of oceanography, the program inspires and motivates young women to consider careers in science disciplines. Activities included a day at sea on a research vessel, career interviews and coastal marine field trips.

The CARTHE team participated in Miami Science Museum’s Integrated Marine Program and College Training (IMPACT) - an Upward Bound program for underprivileged, first-generation, college bound students. The students conduct hands-on drifter experiments in the field, putting into practice what they learned in the classroom.

DEEP-C sponsored an internship program this summer where interns worked one-on-one with scientists in a flexible new program that matched intern applicants with consortium scientists to join ongoing projects. This way the students got experience and the scientists got assistance on current research. Visit the GoMRI website to read more about this program.

CWC held a Mothers and Sons Day in May. They constructed Remotely Operated Vehicles (ROVs) and tested them outside. More on this story here.

Keeping up with the Consortia Blogroll!
Several of the Consortia have been updating blogs. Check them out!
A Day in the Life of a DROPPster
DROPPS
Voices from the Field
Deep-C
Adventures at Sea
C-IMAGE
Cruise Blogs
ECOGIG
Marine Educator’s Blog
CWC
Experiment Blogs
CARTHE
5 Questions Interview with Consortia Grad Students

The front page of this issue of the GoMRI newsletter told the story of a group of scientists coming together to conduct rapid response research after the Hercules Gas Blowout. Part of that team included several graduate students from GoMRI Consortia who were recruited into action. We’re straying from our “7 questions” format this issue to talk to all five of them about their experiences.

1. What was your role in the research?

Sarah Weber (ECOGIG): Just as our six-week ECOGIG research cruise in the Gulf of Mexico was coming to an end, we received news of the Hercules natural gas rig explosion. Carried by a whirlwind of last minute preparations and planning, we found ourselves on the shores of Cocodrie, LA at LUMCON, scrambling to head out to sea yet again to sample around the rig. Due to the last minute nature of the cruise, Joe Montoya, Chief Scientist for many of the ECOGIG water column cruises, could lead only the day-long portion of the Hercules cruise. This left Joy Battles and me the opportunity to serve as Co-Chief Scientists for the remainder of the field operation. It became our responsibility to assess the Hercules blowout situation first-hand.

Nathan Laxague (CARTHE): My role in the Hercules deployment was one of execution. At first notice of the blowout, my role was to prepare the housings and power for the GPS units and attach them to the individual drifters. It was then my responsibility (along with Conor Smith) to drive the prepared drifters to Cocodrie, LA and execute the deployment operation.

Tiffany Warner (CWC): Our lab’s objective was to quantify respiration rates, which were hypothesized to be stimulated by the release of gaseous hydrocarbons into the water column, and ultimately the oxygen available in the region.

2. As a student, how did this experience relate to the work you’re doing to earn your degree?

Conor Smith (CARTHE): Currently, my research has been focused on comparing satellite retrieved surface current fields to in-situ drifter measurements. I have been involved with three field research experiments involving measurements of surface currents using various drifter designs. My research has been very exciting since I have been able to combine a remote sensing platform that seems a little intangible to me, to physical drifters that I am able to build and deploy with a group of other researcher. These two ways of measuring surface currents seem to complement each other very well.

Sarah Weber: I was an undergrad at Georgia Tech, and have been very involved with this project from the start. I am in the process of applying to Georgia Tech’s Master’s program in Biology, with plans to begin this spring. This specific research experience has directly contributed to my decision to pursue a postgraduate degree in Biogeochemistry and has given me an exciting taste of what it’s like to lead an oceanographic expedition.

Tiffany Warner: I am working on obtaining a degree in oceanography and coastal science; as a result I am expected to learn the four core oceanography disciplines which are biological, chemical, physical, and geology oceanography, all of which we used on this research cruise. It is one thing to read this information in a book or hear about it in lecture, but to be out in the field and utilizing the methods you’ve spent countless hours learning, helps you to integrate all the parts you’ve been taught and how you can actually apply it.

continued on next page...
3. What was the most interesting part of the experience for you?

**Joy Battles (ECOGIG):** I have been involved with other deployments, such as floating sediment traps, but the fact that the data were being transmitted back in real time to help choose sampling locations was really amazing.

**Conor Smith:** After so much effort was put forth to make the Hercules experiment possible, I really enjoyed seeing the crippled Hercules for the first time. The previous, sleepless, hectic three days of rebuilding the drifters, driving non-stop to LA from Miami, loading the vessel and then the long steam out to the deployment site had distracted me from the reality of why we were doing all of this work. As the crippled and damaged Hercules rig came into view over the horizon, I truly realized the importance of our mission and the efforts felt worthwhile.

**Sarah Weber:** Serving as Co-Chief Scientist with Joy was an amazing opportunity. Yes, it was incredibly stressful and A LOT of work. Yes, I made mistakes and felt very under-qualified. But it was a great experience that I am so grateful to have had, simply because I learned so much from it.

4. What do you think is the most important accomplishment of this endeavor?

**Joy Battles:** The most important amazing part of this effort was the speed at which the response was organized and the cohesiveness with which all the parties involved worked to achieve the common goal of investigating and documenting this explosive event. Because of the group effort, much more was accomplished than any individual could have been achieved working alone.

**Conor Smith:** For the first time that I am aware of, an “emergency” oceanography deployment of drifters was planned and executed in less than three days. Had there been a contaminant of some sort released, our drifters would have provided one-of a kind data to predict the transport of the contaminant in the ocean.

**Nathan Laxague:** I’d say that the most important part of this endeavor is the precedent it sets: for marine scientists to respond quickly to a disaster in order to study it. It certainly adds an immediately practical dimension to the work.

5. What would you like the public to know about this effort?

**Joy Battles:** Events like the Hercules blowout impact the Gulf’s fragile ecosystems. It’s easy to overlook the effects of a natural gas leak because gas is invisible to the eye, but methane is an important contributor to global warming and it plays an important role in oceanic food webs. As long as humans endeavor to extract oil and gas resources from the Gulf’s seabed, it is important for scientists to study the consequences of such accidental releases.

**Conor Smith:** As GPS become more accessible they are allowing oceanographers to collect data never before possible. We are at a very cool forefront in ocean science because we are going to be able to analyze small processes that were too small to measure before.

**Nathan Laxague:** I’d like the public to know that this is an exciting time in the fields of marine science- not only because of a few esoteric results benefitting the ivory tower, but also for the good of society and the world we live in at large. There are big questions to be resolved in the field of upper-ocean transport, and the answers to those questions will go a long way towards mitigating our impact upon the earth.

**Sarah Weber:** It’s important for the public to understand why research like this is critical. Whether we like it or not, oil and gas currently fill a very large and necessary portion of our energy needs. There are inherent risks and drawbacks associated with these resources, many of which we are very aware of, but not all of which we understand. It is our responsibility to understand the impact of oil/gas spills on the environment so that we may know how to better respond to situations like the DWH oil spill, and more effectively mitigate the effects.

**Tiffany Warner:** The more scientific information available the better equipped we are to make decisions in the future. Efforts such as this one demonstrate to the public our ability to engage rapidly and study the effects of disturbances that occur in the Gulf of Mexico and the importance of having long term data sets.
Boaters, Vacationers, and Beach Lovers Report GISR Drift Cards for Oil-Spill Research

Adults and children from Florida to Texas are calling, emailing, and going online to report little yellow cards they find in the water and on the beach. The locations of these cards give scientists important information for an ongoing study to aid future oil spill response. The data are important enough to be prize-worthy and the public’s participation in science is getting regional media attention. The first 1,250 drift cards released elicited more than 200 responses.

The Gulf Integrated Spill Research (GISR) consortium is using the cards as part of a larger research effort to understand how wind and currents move items on surface waters. The deployment and recovery data from the drift cards will go into a particle tracking model – the Larval TRANSport Lagrangian model (LTRANS). Lagrangian models help scientists understand the many factors which influence the hidden pathways along which air and water flow.

Scientists took great care with manufacturer specifications to make the drift cards environmentally friendly, not adding to ocean trash or toxins. Each month, the research team sends a $25 gift card to a person randomly-selected by a computer from names of people who report a card.

Adapted from a longer article. Original article published here.

Science Corner
Published science highlights from the GoMRI program

Provenance of Corexit-related chemical constituents found in nearshore and inland Gulf Coast waters.
Joel S. Hayworth and T. Prabakhar Clement

Surface trajectories of oil transport along the Northern Coastline of the Gulf of Mexico
J.C. Dietrich, C.J. Trahan, M.T. Howard, et al
Continental Shelf Research 2012, 41, 17-47

Polycyclic Aromatic Hydrocarbons (PAHs) in Mississippi seafood from areas affected by the Deepwater Horizon oil spill
Kang Xia, Gale Hagood, Christina Childers
Environmental Science & Technology 2012, 46 (10), 5310–5318

Observation-based evaluation of surface wave effects on currents and trajectory forecasts.
Johannes Röhrs, Kai Hákon Christensen, Lars Robert Hole, et al
Ocean Dynamics 2012, 62 (10-12), 1519-1533

Influences of Sea Surface Temperature Gradients and Surface Roughness Changes on the Motion of Surface Oil: A Simple Idealized Study
Yangxing Zheng, Mark A. Bourassa and Paul Hughes
Journal of Applied Meteorology and Climatology 2013, 52, 1561–1575

Assessment of cyclodextrin-enhanced extraction of crude oil from contaminated porous media.
Heng Gao, Martin S. Miles, Buffy M. Meyer, et al
Journal of Environmental Monitoring 2012, 14, 2164-2169

To see all GoMRI publications, please visit the GoMRI Publication Database.

ECOGIG Holds Successful Media Day

On July 5, a group of about 20 representatives from local media outlets, GoMRI, the Stennis Space Center, the Port of Gulfport, and the University of Mississippi visited with ECOGIG scientists returning from a rare tandem cruise to study oil and gas seepage in the Gulf of Mexico. The two-hour media event included tours of the Nautilus and Endeavor, as well as interviews and Q&A with ECOGIG scientists. The event resulted in stories by local newspapers and TV stations. See the ECOGIG website and our Media Clips of the Quarter to check them out.
Frequently Asked Questions by Dr. Chuck Wilson

**Dr. Chuck Wilson, Chief Scientific Officer for the Gulf of Mexico Research Initiative (GoMRI), answers a few of the most frequently asked questions about the program.**

**Question:** As a result of the Deepwater Horizon Oil Spill, there is renewed interest and new funding available for scientific research in the Gulf of Mexico. What are some of the new programs coming online and how does GoMRI fit in?

**Answer:** The Deepwater Horizon oil blowout was a tragic event and the crude oil released made it the largest oil spill in U.S. history. The new funding sources dedicated to scientific research will provide the opportunity to understand the ecological, public health and socio-economic impacts of the disaster and to lead to more effective disaster response in the future.

The Gulf of Mexico Research Initiative (GoMRI) was implemented to understand the effects of the oil spill. BP committed $500 million over a 10-year period to create the broad, independent research program to be conducted at research institutions primarily in the US Gulf Coast States. GoMRI began in 2010 and is an independent, scientific program that is managed through the Gulf of Mexico Alliance (GOMA) and its subcontractors.

Several new programs are also being funded through the settlement of Federal criminal charges:

In 2013, the National Academies of Science was asked by the Dept. of Justice to establish a research program focused on human health and environmental protection, including issues relating to offshore oil drilling and hydrocarbon production and transportation in the Gulf of Mexico and on the U.S. outer continental shelf. The new NAS Gulf Program is funded by criminal penalties arising from Deepwater Horizon incident, totaling $500 million to be spent within 30 years. The 30 year timeline offers an extraordinary opportunity to support long-term research, development and monitoring.

The RESTORE Act was signed into law in July 2012 and established the Gulf Coast Restoration Trust Fund. Eighty percent of the penalties from violations of the Clean Water Act will go into this fund, which will be allocated to the Gulf States, Restoration activities, a Centers of Excellence Research Grant program and a NOAA Gulf Science Program (see image). The goal of the NOAA Restore Act Science Program is to carry out research, observation, and monitoring to support the long-term sustainability of the Gulf of Mexico ecosystem, fish stocks, fish habitat, and the recreational, commercial, and charter fishing industry in the Gulf of Mexico. Priority will be given to integrated, long-term projects.

The National Fish and Wildlife Federation also received funds from the settlement that will be used to conduct or fund projects to remedy the resources that were damaged by the oil spill.

These programs are all separate from the Natural Resources Damages Assessment (NRDA) Process, the legal process to determine the type and amount of restoration needed to compensate the public for harm to natural resources and their human uses as a result of the spill. That process is ongoing and more information can be found on NOAA’s Gulf Spill Restoration and the Damage Assessment, Remediation, and Restoration Program (DARRP) webpages.

An important opportunity emerging out of the ongoing and anticipated research and restoration activities is collaboration. All of the above groups are already working together to assure effective communication and information sharing to maximize resource investment and impact.
GoMRI Research Board Convenes Workshop on Oil Spills and Public Health

The Gulf of Mexico Research Initiative Research Board – a group of twenty science, public health, and research administration experts – convened a Public Health Workshop on July 30, 2013, to discuss the most pressing needs for future public health-related research. Experts from public health, environmental exposures, oceanography, community research, and socioeconomics attended the workshop. Their goals were to inform future research decisions related to public health impacts of oil spills, develop a portfolio of research important to scientific and lay communities, and facilitate interdisciplinary research that includes public health and oceanography. Guiding the discussion were three overarching perspectives (“one health,” “portfolio,” and “preparedness”) and two levels of focus (community and individual).

**Five research themes** guide all research funded by the Gulf of Mexico Research Initiative, with the aim to sponsor research with the greatest possible impact. As a result of this meeting, the Research Board updated Theme 5 to include public health research goals: “Impact of oil spills on public health including behavioral, socioeconomic, environmental risk assessment, community capacity and other population health considerations and issues.” The intent of this revision is to increase proposal submissions that address important scientific gaps and community concerns.

Read more information about this meeting at the [Gulf of Mexico Research Initiative (GoMRI) History page](http://www.gulfresearchinitiative.org).

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**GoMRI Mourns the Passing of Dr. Raymond Highsmith**

“We are deeply saddened by the loss of Dr. Ray Highsmith,” said Dr. Rita Colwell, Research Board Chair of the Gulf of Mexico Research Initiative. “Ray was a leader in the field of undersea research. The geographical reach of his work ranged from the Pacific to the Atlantic and from Prince William Sound to the Gulf of Mexico. His excellent scientific contributions and experienced leadership also included the formation of successful science teams, the most recent being the ECOGIG consortium.”

![Dr. Raymond C. Highsmith. Photo credit: Robert Jordan/Ole Miss Communications](image)

Highsmith dedicated his career as a marine scientist to the study of seabed oil and gas hydrates. He focused over two decades on researching oil spills, most recently in the Gulf of Mexico and previously in Alaska. His lengthy record of publication and service made him a leader in the marine sciences research community.

Dr. Highsmith was the founder and Director for the Ecosystems Impact of Oil and Gas Inputs to the Gulf (ECOGIG) consortium for the Gulf of Mexico Research Initiative. He also was the Executive Director of the National Institute for Undersea Science and Technology (NIUST) – a partnership between the University of Mississippi, the University of Southern Mississippi, and NOAA’s Undersea Research Program.

*Adapted from a longer article. Original article published [here](http).*

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**LOVE THE GULF?**

Check out the recent public awareness campaign from DEEP-C! You can download and print your own “Love the Gulf” stickers and posters from their [website](http).
The 2015-2017 GoMRI Research Consortia RFP, to be released in mid-November 2013, will select the research activities for GoMRI Years 5–7 (January 1, 2015 – December 31, 2017) involving Research Consortia (i.e. collaborations between 4 or more institutions). The total funds available for distribution to Research Consortia through this RFP will be approximately $35 million per year.

The 2015-2017 GoMRI Research Consortia RFP will include the five GoMRI Research Themes. The GoMRI Research Board encourages potential applicants to consider focusing on their strengths, rather than attempting to cover all research themes included in the RFP. Potential consortia should focus on the quality of the proposed research, rather than quantity, and demonstrate clear knowledge of advances in the field to date.

Unlike previous RFPs, the 2015-2017 GoMRI Research Consortia RFP will include a pre-proposal step. Pre-proposals will be required to qualify for submission of a full proposal in response to the 2015-2017 GoMRI Research Consortia RFP. Based on evaluation of the pre-proposals, applicants will receive feedback encouraging or discouraging them to submit a full proposal. Submission of a pre-proposal will be required for submission of a full proposal, regardless of the nature of the feedback. Even if a pre-proposal is discouraged from submission of a full proposal, the applicants may submit a full proposal.

For more details, please see the GoMRI website.