

## About the Gulf of Mexico Research Initiative

The Gulf of Mexico Research Initiative is a 10-year, \$500 million independent research program established by an agreement between BP and the Gulf of Mexico Alliance to study the effects of the Deepwater Horizon incident and the potential associated impact of this and similar incidents on the environment and public health.

**Would you like to know more about the GoMRI-funded research?**

Check out our Research page on the website:

<http://research.gulfresearchinitiative.org/research-awards/>

## Upcoming Events:

### **Request for Proposals (RFP)-V – Full Proposal Deadline**

March 13, 2015

*For more information, see page 5*

### **Southern Sociological Society 2015 Annual Meeting**

March 25-28, 2015

New Orleans, Louisiana

Stop by the GoMRI Booth!

# SNOW IN THE GULF OF MEXICO?

It may not happen too often on land, but beneath the surface of the ocean, it's a whole different story. As plants and animals living near the ocean's surface die, they decay and fall to the seafloor in a natural phenomenon known as marine snow, which gets its name because the decaying material can look like fluffy white snowflakes as it drops. The formation and fall of marine snow is a common process in the Earth's oceans and provides food for many deep-sea creatures who consume the decaying organic material on its way to the ocean floors and after it has settled. The amount of marine snow that makes it to the seafloor depends on a number of factors, but on average only 1-10% of the material formed at the top of the water column ends up on the bottom of the ocean without being consumed in shallower water. This sediment accumulates over millions of years into a layer of thick, muddy "ooze" that covers the ocean floor.

Researchers in the GoMRI program have been studying the effect of the Deepwater Horizon (DWH) event on the formulation and sedimentation of marine snow in the Gulf of Mexico for years. The Gulf of Mexico system is unique in that oil seeps are a common natural occurrence in the region and the system biota has already adapted to respond to small amounts of oil in the water column. However, a large, prolonged, release of oil such as the one associated with the DWH event has never been seen before and provides much area for further study. Dr. Uta Passow, a researcher at the University of California, Santa Barbara studies the formation and sedimentation of marine snow in the water column and serves as steering committee chair for a GoMRI funded inter-consortia working group on the topic. According to Dr. Passow, while initially many members of the general public and oil spill responders may only have been thinking of the spilled oil as "going up" through the water column and dispersing across the surface of the ocean, soon after the spill "people began realizing that a huge sedimentation event was also observed" and that it deserved scientific attention.

Dr. Passow uses sediment traps to determine several key characteristics of marine snow and oil aggregates. However, it was quickly realized that her trap work was only one piece of the puzzle. Other GoMRI researchers were focusing on marine oil snow through different perspectives, including experimental work and in situ

*Funnel shaped sediment traps like this one are suspended just above the seafloor and left to collect deposits for several weeks at a time before being moved to a new location. Once retrieved (after a year or so) the collected sediments are subjected to biochemical analysis to provide a good view of what sank and when. Photo Credit: Uta Passow, UCSB.*

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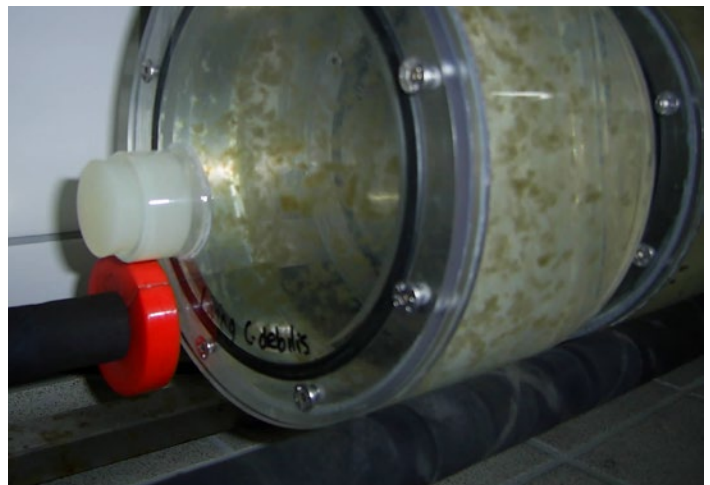


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observations. Thus, Dr. Passow and her colleagues, Dr. Jeff Chanton (FSU), Dr. Kendra Daily (USF) and Dr. David Hollander (USF) began working together to ensure that they were achieving a holistic picture of the rapidly sinking, marine oil snow sedimentation event that was observed after the spill. The first step, Dr. Passow states, was tackling the challenge of varying terminology across the different research disciplines.

“[The] first thing we noticed was that we have different terminology. I work with the water column and sediment traps, and marine snow is something which has been around for a very long time. Not associated with oil, but marine snow is a term which we all know and [the term] is characterized. We know a lot about marine snow. The people working on the seafloor, they call things floc, flocculent materials... and floc for me has a totally different meaning. [For me] floc is a special kind of marine snow, not just material that lands on the seafloor... That’s when we came up with this name.”

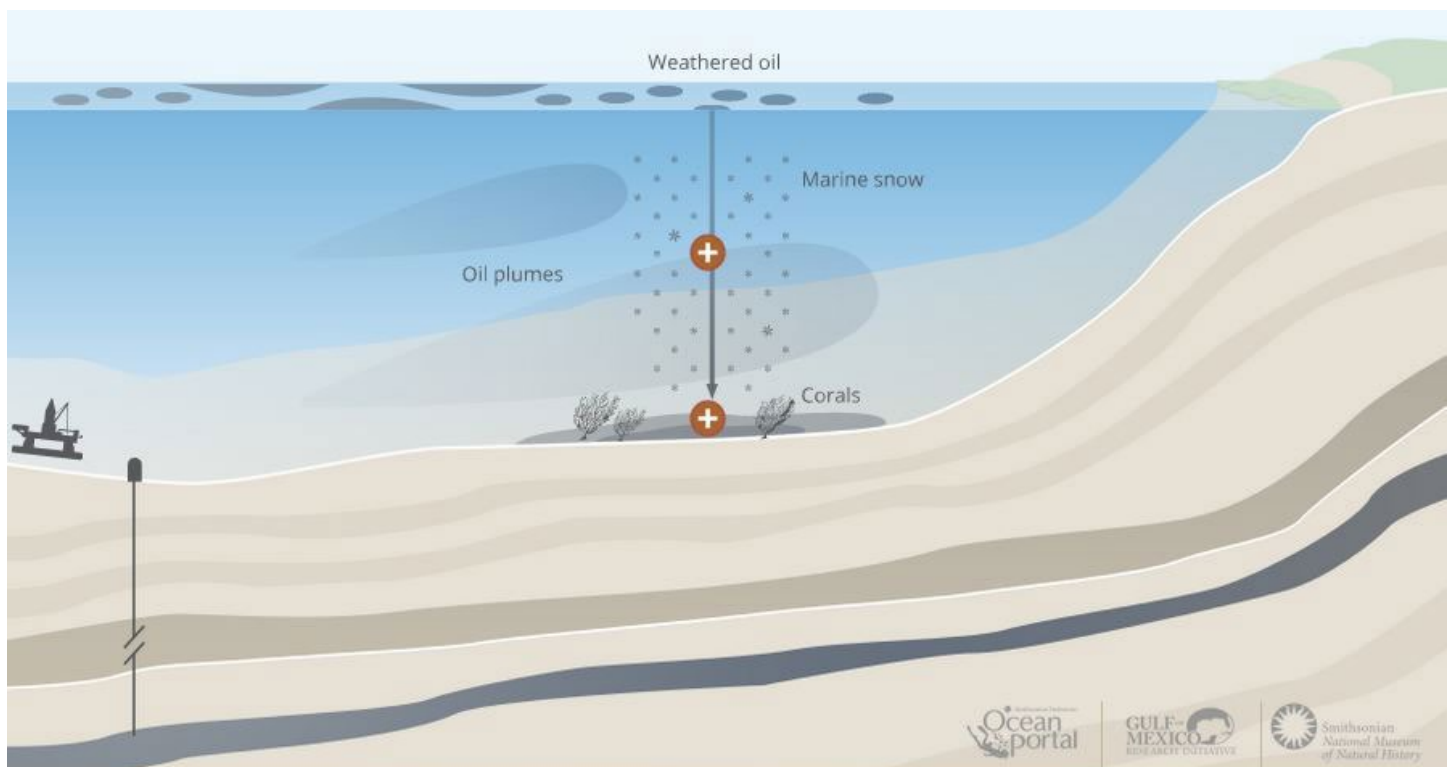
The name they developed to reconcile the well-established terminology in their respective fields, Marine Oil Snow Sedimentation and Flocculent Accumulation (MOSSFA) was originally intended simply to be the name of their inter-consortia working group, but has come to characterize all studies on the processes involved with marine snow and its accumulation at the seafloor in relation to oil spills and various mitigation measures (e.g. the use of dispersants and in situ burning).



Rolling tanks and a rolling table full of marine snow made from phytoplankton (microscopic algae). Rolling tanks were used to investigate different conditions (e.g. presence of dispersant, phytoplankton, and oil) and how they impact formation of different types of oil-associated marine snow. Photo Credit: Uta Passow, UCSB.

In October of 2013, researchers from six GoMRI consortia along with a number of experts not currently involved in GoMRI-funded research met in a collaborative MOSSFA workshop. The overarching goal of this workshop was threefold: to raise awareness of MOSSFA within the research and oil spill response community, to develop and discuss related concepts and plans for future research, and to forge connections between interested parties. Their discussion centered on several of the key questions involved in MOSSFA research such as: What is the extent of the oiled sediment layer? How does the presence of

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Check out the [Anatomy of an Oil Spill Infographic](#) on the Smithsonian Ocean Portal Website to trace the path of the oil and read more about the impacts GoMRI researchers are finding on the seafloor. Illustration by Lucy Reading-Ikkanda for the Smithsonian Ocean Portal.

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large amounts of oil and nutrient rich river sediments influence the formation of marine snow? Do common oil spill mitigation activities influence marine snow formation? And, what are the effects of the oiled sediments on deep water environments? Through two days of discussion and breakout groups, the MOSSFA researchers were able to begin answering these questions and identify areas where further information and research is needed.

The great success of the workshop can be measured by the numerous collaborations and sub-groups that have developed and continue to work together long after its close. "As a result of the workshop... people found each other and topics which need to be moved forward, and began working on them together," Passow states. For example, Passow herself has been joining in on discussions with other organizations who are using sediment traps for research in the Gulf, including Woods Hole Oceanographic Institute and the US Geological Survey. This coordination is worthwhile, as the locations and timing of the traps differ from one study to the next. Their collective data can be used to broaden the overall understanding of the extent and thickness of the oil sediment layer, as well as inform sedimentation rates at varying distances from the DWH site.

Another important relationship formed from the workshop is collaboration between MOSSFA scientists and National Oceanographic and Atmospheric Administration (NOAA) modelers. It is widely believed among MOSSFA scientists that anywhere from 3-25% of the oil released during the spill was deposited on the seafloor as a result of marine snow sedimentation; however, this pathway was not considered in response strategies and is not included in the oil budget calculator for the DWH spill. GoMRI scientists have been in

talks with Bill Lehr, a senior scientist at NOAA, discussing what information modelers would need to enable the integration of sedimentation into their models. In addition, during the 2014 Gulf of Mexico Oil Spill and Ecosystem Science Conference, a Town Hall event was held in which GoMRI scientists met with oil spill responders from NOAA and the US Coast Guard. They addressed ways that the MOSSFA theory could be included when using numerical models to predict the effects of spill response measures on the fate of spilled oil and to discuss the potential long-term contamination of benthic habitats and its impact on important benthic dependent fish species.

MOSSFA research continues to be an area of strong interest for GoMRI scientists, with researchers from multiple consortia involved in the work. Plans are underway for another inter-consortia workshop in the future and related publications are increasing in number, with several expected to be included in an upcoming issue of Deep Sea Research II (Discussed in more depth in this issue's Notes from the Research Board Chair on [Page 5](#)). Dr. Passow summarizes the importance of their combined efforts well. "The impact of the oil on the open ocean ecosystem when it is disbursed and diluted at the top of the water column is very different from the impacts it has when it sinks and accumulates on the seafloor... We need to know where the oil is to learn how to keep the damage to a minimum for the whole ecosystem, and for that we need to understand all of the pathways involved" and those certainly include MOSSFA.



## Smithsonian Features Blog by Caroline Johansen on Deep Sea Oil Seeps

**There can be catastrophic results when a large amount of oil is spilled into the ocean, but did you know that many marine organisms need a little bit of oil to survive?**

The Smithsonian Ocean Portal posted a guest blog by [Caroline Johansen](#) explaining how natural oil and gas seeps from the ocean floor act as a source of energy for bacteria.

[Read Johansen's Ocean Portal blog.](#)



## Conference Wrap-Up

More than **1000 people** from **21 countries** participated in the annual conference to discuss research associated with the Deepwater Horizon oil spill of 2010. The conference included approximately **270 oral presentations** and **230 posters**, plenary sessions, and many other associated events through the week. Abstracts from the presenting scientists can be viewed [online here](#). And an official conference report will be made available on the [conference website](#) in the near future.



# GoMRI Newsmakers

## Congratulations to the following member of the GoMRI community!

Congratulations go out to Dr. Samantha “Mandy” Joye, on her selection as an American Association for the Advancement of Science (AAAS) Fellow. Mandy Joye is a microbial geochemist with the University of Georgia and a lead scientist for the GoMRI-funded [Ecosystem Impacts of Oil and Gas Inputs to the Gulf \(ECOGIG\)](#) consortium. She is also the Principal Investigator of a recently-awarded GoMRI grant to continue this research. Joye’s expertise lies in quantifying rates of microbial hydrocarbon metabolism and environmental geochemical signatures in natural environments. She has studied Gulf of Mexico natural seeps for 20 years and has tracked the environmental fate of oil and gas released from the Macondo well blowout since May 2010.

## NEW CONSORTIA!

### TWELVE CONSORTIA AND \$140 MILLION TO STUDY OIL IMPACTS ON GULF OF MEXICO

Through the RFP-IV program, GoMRI is awarding \$140 million to support research to be carried out from 2015 through 2017. GoMRI Chief Scientific Officer, Chuck Wilson, addresses FAQ on the new consortia on [page 10](#). Research consortia selected for funding are:

- **Nova Southeastern University, [“Deep-Pelagic Nekton Dynamics of the Gulf of Mexico”](#)**  
Consortium Director: Tracey Sutton
- **University of Miami – Rosenstiel School of Marine and Atmospheric Science, [“Relationship of Effects of Cardiac Outcomes in Fish for Validation of Ecological Risk”](#)**  
Consortium Director: Martin Grosell
- **University of Texas at Austin, [“Dispersion Research on Oil: Physics and Plankton Studies”](#)**  
Consortium Director: Edward Buskey
- **University of Southern Mississippi, [“Consortium for Oil Spill Exposure Pathways in Coastal River-Dominated Ecosystems”](#)**  
Consortium Director: William (Monty) Graham
- **University of Louisiana at Lafayette, [“Littoral Acoustic Demonstration Center”](#)**  
Consortium Director: Natalia Sidorovskaia
- **Marine Environmental Sciences Consortium/Dauphin Island Sea Lab, [“Alabama Center for Ecological Resilience”](#)**  
Consortium Director: John Valentine
- **Texas A&M University, [“Role of Microbial Exopolymers in Aggregation and Degradation of Oil and Dispersants”](#)**  
Consortium Director: Antonietta Quigg
- **Louisiana Universities Marine Consortium, [“Coastal Waters Consortium”](#)**  
Consortium Director: Nancy Rabalais
- **University of Miami, [“The Consortium for Advanced Research on Transport of Hydrocarbon in the Environment II”](#)**  
Consortium Director: Tamay Özgökmen
- **RAND Corporation Gulf States Policy Institute, [“Consortium for Resilient Gulf Communities”](#)**  
Consortium Director: Melissa Finucane
- **The University of Georgia, [“Ecosystem Impacts of Oil and Gas Inputs to the Gulf – 2”](#)**  
Consortium Director: Samantha Joye
- **University of South Florida, [“The Center for the Integrated Modeling and Analysis of Gulf Ecosystems II”](#)**  
Consortium Director: Steven Murawski

## Note from the Research Board Chair

Dr. Rita Colwell, University of Maryland and Johns Hopkins University

GoMRI research is carried out in approximately 192 institutions located in 37 states and seven countries. Thus, the challenges in coordinating such a far-reaching community of scientists are complex and occasionally daunting. The GoMRI Research Board recognizes the need to foster synthesis and communication among scientists, policy makers and the public, especially within the GoMRI research community and other scientists. GoMRI has moved rapidly to this goal by sponsoring a special issue of *Bioscience*, *Understanding the Biological Effects of the Macondo Blowout*, published in September 2014.

The theme of this special issue was biological impacts of oil on the Gulf of Mexico ecosystem. Research conducted by two of the GoMRI-funded research consortia, Coastal Waters Consortium (CWC) and Ecosystem Impacts of Oil and Gas Inputs to the Gulf (ECOGIG) consortium, provides a holistic view of effects on a range of organisms from microbes to terrestrial vertebrates and on ecosystems from deep in the Gulf to beaches and wetlands along the coast. Seven scientific papers in the *Bioscience* special issue describe impacts of oil, each from a different research perspective, and comprise an informative set of literature reviews and research results.

Other publications featuring GoMRI research have been published or are in preparation. GoMRI scientists from four consortia, CWC, Deepsea to Coast Connectivity in the Eastern Gulf of Mexico (Deep-C), Consortium for Advanced Research on Transport of Hydrocarbon in the Environment (CARTHE) and Gulf of Mexico Integrated Spill Response Consortium (GISR) participated in the International Oil Spill Conference held in Savannah, GA in May 2014 and nine publications featuring their research were included in the conference proceedings. More information and a listing of the publications can be found on [page 11](#) in this newsletter. A topical issue of *Deep-Sea Research Part I* is scheduled for release in early 2015 and will feature about 40 papers prepared by research scientists from six of the GoMRI consortia, reviewing the state of the ecosystem of the Gulf of Mexico, before, during, and after the DWH event.

These special issues are informative not only for the scientific community, but also for public understanding of the Gulf of Mexico response to the DWH oil spill. At this halfway mark for the Gulf of Mexico Research Initiative it is exciting to see these synthesis activities develop and come to fruition. GoMRI scientists continue their work and are publishing together as a team. Many more communications will be forthcoming both in scientific journals and in the lay press. Stay tuned!



Photo Credit: GOMRI, no changes made.

## Update: Request for Proposals (RFP)-V

The Gulf of Mexico Research Initiative received 472 Letters of Intent (LOI) for RFP-V prior to the LOI deadline on December 15. The purpose of the required LOI submissions is to facilitate peer-review planning. The deadline for submitting full proposals is Friday, March 13, 2015 at 5:00 p.m. Eastern time.

Researchers are strongly encouraged to complete their submissions early and allow adequate time to submit prior to the deadline. When preparing materials for submission, applicants can go to the GoMRI website to review responses to RFP-V Frequently Asked Questions, read the RFP-V, and learn more about the Peer Review Process.

[For more details, please see the GoMRI website.](#)

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## Education Spotlight:

**ECOGIG** scientists recently launched the “*Science at the Stadium*” education program to connect fascinating undersea research technology with the thrilling college football atmosphere. On game day at the University of Georgia (UGA) and University of Mississippi (UM) stadiums, researchers invited kids to pilot remotely operated vehicles (ROVs), the robotic submarines used in marine research. Visitors had the opportunity to build their own ROV and see the Mola Mola, an Autonomous Underwater Vehicle (AUV) that takes detailed pictures of the seafloor.

**Deep-C** hosted its *Inaugural Student Research Symposium* in fall of 2014. This two-day event focused on helping students navigate the challenges they face in their journey to become scientists, now and in the future. Students shared their ongoing research while audience members recorded their observations and suggestions, such as details about specific slides or public-speaking techniques to provide constructive feedback. Short talks by invited experts, interspersed throughout the days, addressed carefully selected student-centered topics, such as “Responsible Conduct in Research,” “Stewardship of Scientific Datasets,” and “Put Your Degree to Work: Planning for a Successful Career.”



Ph.D. student Ryan Sibert directs the young ROV pilots at a game in Athens, Georgia. Photo Credit: Christine Laporte/ECOGIG.

## GoMRI Scholars in Action



Left to Right: Cheng Li (DROPPS), Xuan Chen (CWC), David Christiansen (GISR), Richard Dannenberg (ECOGIG), Nathan Laxague (CARTHE)

The Gulf of Mexico Research Initiative (GoMRI) is recognizing the graduate students whose vital research contribute to improve understanding about the damage, response, and recovery following the Deepwater Horizon oil spill. Candidates for this program must be graduate students who have participated in a GoMRI-funded project for at least one year, whose work is primarily funded by GoMRI, and who are working on a dissertation or thesis based on GoMRI-funded science.

### Learn more about the scholars’ research and career paths on the GoMRI Website:

- [Grad Student Dannenberg is Unlocking Mysteries of Deepwater Coral Communities](#)
- [Grad Student Chen Knows Ants Are More Than Just Bugs - They’re Oil Detectors!](#)
- [Grad Student Li Creates Waves for Oil Dispersion Studies](#)
- [Grad Student Laxague is Making Waves Using Sea-surface Ripples to Detect Oil](#)
- [Grad Student Christiansen’s Preemptive Research Enhances Galveston Bay Spill Response](#)



# GoMRI Researcher Interview with Dr. Irv Mendelssohn

Dr. Irv Mendelssohn from Louisiana State University answered a few questions about his RFP-II project, *Accelerating Recovery after the Deepwater Horizon Oil Spill: Response of the Plant-Microbial-Benthic Ecosystem to Mitigation Strategies Promoting Wetland Remediation and Resilience*.

## 1. Tell us a bit about your research. What are the goals of your project?

Coastal wetlands are well known for the variety of ecosystem services they provide to society, like storm protection, water quality enhancement, fisheries support, carbon sequestration and many others. Most, if not all, of these ecosystem services are dependent on a healthy vegetation community in association with functioning soil microbes and soil invertebrates. It is the goal of our research to understand the effects of the *Deepwater Horizon* oil spill on this integrated ecological system of vegetation, benthic microbes, and invertebrates, the extent of recovery thus far, and the remediation actions that might be taken to accelerate recovery where it is lagging. This goal is being addressed through a multi-investigator effort of Dr. Qianxin Lin and me investigating vegetative response and recovery, Dr. Aixin Hou assessing microbial responses, Dr. John Fleeger evaluating the algae and small invertebrates that live on and in the soil, and Dr. Don Deis, who studies the marsh snails and crabs that depend on the vegetation.

## 2. What is your background and how did you get involved with this kind of work?

My training is as a coastal plant ecologist attempting to understand the factors that control the health of coastal vegetation, particularly the ecological condition of coastal wetlands. I have carried out this research throughout the US and internationally during my scientific career of 40+ years. It was an oil spill that occurred in the marshes adjacent to Nairn, Louisiana on April 23, 1985, interestingly almost 20 years to the day of the *Deepwater Horizon* event that brought me into oil spill research. I assessed the initial impact of that spill on the affected saline marshes, and, through funding from the Louisiana Sea Grant Program with collaboration from colleagues Drs. Mark Hester and Jack Hill, formerly at LSU, we were able to identify controls on recovery. Subsequently, I was asked to assess impacts and response actions associated with oil spills in California, Texas, Canada, and a number of times again in Louisiana. During this period, Qianxin Lin joined my research group as a Ph.D. student investigating the differential response of marsh plant species to oiling. We later collaborated to establish an oil spill research program. We've worked together for almost 20 years on various oil spill projects, and have published more than 30 oil-spill related scientific publications. Thus, my interest in oil spill research started much before the *Deepwater Horizon* spill.

## 3. What are some of the methods you use to study the impacts of oiling on coastal wetlands? Have you faced any major challenges while carrying out your research?

Our research team uses a variety of methods from simple measurements of plant biomass to highly technical assessments of microbial composition and function with GeoChip microarray analyses and the quantification of oil-degrading genes with real-time quantitative polymerase chain reactions. Our major challenge has been the ever-decreasing extent of oiled shoreline marsh from which to sample due to shoreline erosion. Many of the oiled marshes have historically had high rates of shoreline erosion and, in addition, some shorelines may be seeing accelerated erosion due to oiling. As a result, our study sites are getting smaller and smaller, with less and less oiled shoreline.

## 4. What are some of the most significant or exciting findings so far in your work?

There have been a number of significant findings in our work so far, including: 1) While there were initially severe impacts to the vegetation-microbial-benthic ecosystem in heavily oiled marshes, recovery of vegetation, microbial communities, and invertebrates have generally been robust. For example, juvenile snails are recruiting and establishing in the heavily oiled sites indicating that population dynamics are starting to recover to that which is considered a healthy population. 2) Nonetheless, some individual species of plants and animals showed poor recovery along heavily oiled marsh shorelines, even though the general trend of recovery was the norm. 3) The oil-degrading microbial communities, which had faster recovery in moderately oiled sites than heavily oiled, were increasingly dominated by gram-positive (GP) PAH-degrading bacteria with time over a course of 30 months following the DWH spill; the microbial degradation of the petroleum residuals has come to its latter stage two and a half years after the spill. 4) Moderately oiled marshes showed few initial impacts or long-term effects on the plant, animal and microbial variables measured in our study. 5) Heavy oiling reduced the soil shear strength of surface soil with concurrent increases in surface erosion. 6) Certain petroleum hydrocarbons, such as naphthenic acids, were still present in sediments 48 months post-spill, which may pose an environmental concern.

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## 5. What are the broader implications of your research and how might your findings inform the management of Gulf Coast wetland areas?

Our research supports the accepted paradigm that coastal wetlands are relatively resilient to oil spills. However, this should not be construed to mean that oil spills don't have significant immediate (short-term) impacts to wetlands and the societal services they provide. Nor does this general resilience contradict observations of impacts to specific biota or functional processes.

From an oil spill response perspective, our research confirms the importance of preventing spilled oil from entering wetlands. However, once oil enters wetlands all cleanup activities should be benign with respect to the long-term health of the system, given that natural recovery to oiling can be high.

## 6. Can you tell us more about your research collaboration with fellow GoMRI researchers?

In collaboration with Amy McKenna, a GoMRI researcher, and her group at the National High Magnetic Field Laboratory, we have catalogued compositional changes of oil residuals in saltmarsh sediments in Barataria Bay over a course of four years post the oil spill by using Fourier transform ion cyclotron resonance mass spectrometry (FT-ICR MS).

## 7. If funding were not an issue, what would add to your project?

There are really an endless number of processes and biota that could be investigated relative to immediate response to oiling and recovery over time. Being able to incorporate aspects like fish ecology and biogeochemical nutrient cycling would have been very valuable. Also, our current microbial study is focused on DNA-based microbial community composition and structure. If we had more funding to support a postdoctoral researcher, we would also investigate dynamics of microbial community function in response to oil input, based on RNAs (i.e., transcriptomics). From a general perspective, this project would have greatly benefited from field experiments where different oiling scenarios and cleanup techniques could be evaluated under real world conditions. In lieu of this, large-scale greenhouse experiments that mimic the real world would be a valuable contribution.

## Science Corner

Published science highlights from the GoMRI program

### **Study Identifies Efficient Food-Grade Emulsifier as Dispersant Alternative**

J.C. Athas, K. Jun, C. McCafferty, O. Owoseni, V.T. John, and S.R. Raghavan  
Langmuir, 2014, 30 (31), 9285-9294

### **Study Shows Drifter Data on Surface Currents Critical to Predict Pollutant Transport**

A.C. Poje, T.M. Özgökmen, B. Lipphardt, Jr., B.K. Haus, E.H. Ryan, A.C. Haza, G. Jacobs, A.J.H.M. Reniers, J. Olascoaga, G. Novelli, A. Griffa, F.J. BeronVera, S. Chen, P. Hogan, E. Coelho, A.D. Kirwan, Jr., H. Huntley, and A.J. Mariano  
Proceedings of the National Academy of Sciences of the United States of America, 2014, 111(35), 12693-12698

### **Study Shows Bursting Bubbles Can Redistribute Oil Droplets into a Water Column**

J. Feng, M. Roché, D. Vigolo, L.N. Arnaudov, S.D. Stoyanov, T.D. Gurkov, G.G. Tsutsumanova, and H.A. Stone  
Nature Physics, 2014, 10, 606-612

### **Study Estimates Decades-Long Persistence of Harmful Hydrocarbons in Marshes**

R. E. Turner, E. B. Overton, B. M. Meyer, M. S. Miles, and L. Hooper-Bui  
Marine Pollution Bulletin, 2014, 86 (1-2), 291-297

### **Study Identifies Highly-Efficient Methane-Eating Microbe Present after Oil Spill**

M. Crespo-Medina, C.D. Meile, K.S. Hunter, A-R. Diercks, V.L. Asper, V.J. Orphan, P.L. Tavormina, L.M. Nigro, J.J. Battles, J.P. Chanton, A.M. Shiller, D-J. Joung, R.M.W. Amon, A. Bracco, J.P. Montoya, T.A. Villareal, A.M. Wood and S.B. Joye  
Nature Geoscience Letters, 2014, 7, 423-427

*To see all GoMRI publications, please visit the [GoMRI Publication Database](#).*



## Mesocosm Experiments Look at Oil Spills from the Bottom Up

Scientists have simulated a variety of deep-sea oil spill conditions in miniature via a pair of mesocosms, an approach that bridges traditional laboratory and *in situ* observations.

A large team of researchers from the Dispersion Research on Oil: Physics and Plankton Studies (DROPPS) consortium have built two tanks (each representing a different timeframe in the spill) to bring relevant components of the Gulf of Mexico into the lab. They intend to observe how oil rises and disperses upon entering the environment and how it interacts with small planktonic organisms once there.

The scientists created two four-meter-tall tanks, each configured with different oil injection systems to simulate different phases of a deep water spill. They designed both tanks at Johns Hopkins University (JHU) with parts built to specifications in Baltimore. The first tank was sent to The University of Texas Marine Science Institute (UTMSI) and took several months to be correctly manufactured and assembled, becoming operational this past spring.

The UTMSI tank simulates the later stage of a spill, when oil encounters native marine plankton in the water column. The bottom of the tank contains heavier, more saline water, with slightly less dense, less saline water in the top half. The scientists insert planktonic diatoms through a port in the side of the tank, and the interface between the two densities suspends them initially in the top layer. They then introduce crude oil, with and without dispersant, slowly through a wide, flat shower head at the bottom, creating a cloud of oil that researchers can observe rising through the planktonic layer.

DROPPS Director Dr. Ed Buskey explains that with the cameras, “We can observe oil droplets rising through this layer of plankton and see how they interact. This helps us answer questions such as, what fraction of the diatoms will be carried up the water column with the rising oil droplets? Will oil droplets collect diatoms and eventually sink?”

These mesocosm experiments allow an interdisciplinary team with expertise in plankton ecology, chemistry, and fluid dynamics to come together to ask questions about how oil moves and interacts in the environment. The team’s findings will help responders work more quickly and accurately to protect people and the environment in a future spill.

***To learn more about the experiments and see a diagram of the Mesocosm tanks in action, check out the full story on GoMRI’s website here: <http://gulfresearchinitiative.org/mesocosm-experiments-look-oil-spill-bottom/>.***



*Joe Katz (left) and Ed Buskey (right) stand at the top of the mesocosm tank at Johns Hopkins University. Photo Credit: Brad Gemmill, UTMSI.*

## Keep up with the Consortia Blogroll!

*Several of the Consortia have been updating blogs. Check them out!*

Measure. Model. Mitigate: [CARTHE](#)

Marsh Edge-U-Cation: [CWC](#)

Voices from the Field: [Deep-C](#)

## 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:** The GoMRI just announced twelve Consortia awards through the RFP-IV process. How can we expect to see the consortia that were previously funded through RFP-I build on their current research as they move forward over the next three years?

**Answer:** All eight of the RFPI consortia have done an excellent job in fulfilling their respective missions. GoMRI investigators have advanced oil spill modeling, identified and tracked previously understood and new oil decomposition analyses through various pathways, tracked impacts and recovery through the ecosystem from the deep ocean to the coastal marshes, advanced technology, and improved our understanding of health effects on various organisms. An important goal of the GoMRI model is to build research capacity in the Gulf region and the five continuing consortia have all proposed to move their respective programs into new directions that will grow our capacity to respond to and predict oil spill impacts. These established teams should be even more productive over the next 3 years as they already have worked to establish that “capacity” and can continue the current momentum. Their equipment and teams are in place, cruises are scheduled and laboratory experiments are in design to advance our understanding of oil spill impacts.

**Question:** How will the seven newly formed consortia impact the current scope of GoMRI research, particularly when addressing the five GoMRI research themes?

**Answer:** The seven new consortia will take GoMRI in several innovative directions, many of which touch on ecological impacts. We have one consortia continuing their NOAA funded research programs on marine mammals with emphasis on whales. The impact of oil spills on marine mammals is poorly understood and sampling in particular is a challenge. There are several new and one continuing consortia working on marine fishes. Fishes are highly mobile and tend to be higher trophic level feeders; they will address questions such as has fish behavior changed or have there been longer term impacts to reproductive capacity or gene pools as a result of the spill. The difficult challenge which we expect these groups to meet is that they must tease out cause and effect, as there are a number of anthropogenic and natural stressors in the marine environment. We have also added one focused public health project that will conduct research, outreach, and education activities aimed at assessing and addressing the public health, social, and economic impacts of the Deepwater Horizon (DWH) oil spill in the Gulf of Mexico region. This Consortium brings together distinguished scientists who plan to address a major cross-cutting issue of concern to Gulf region stakeholders and decision makers: How can communities build resilience to adverse future events like the DWH oil spill?

**Question:** With the advent of this second round of Consortia funding, how are we working with NAS and RESTORE to avoid duplication and leverage opportunities?

**Answer:** Like GoMRI, several other national organizations focused on the Gulf region have been formed through various funding mechanisms as a result of the Deepwater Horizon tragedy. The National Academy of Sciences Gulf Research Program, National Fish and Wildlife Foundation and the RESTORE program housed within NOAA have, like GOMRI, each developed and formalized their own role, scope, mission and process for distributing funds. All four groups have worked together to communicate activities under our respective charges. Each program is unique and different, but by having regular conference calls and meeting at conferences of opportunity we have prevented overlap and duplication since inception. Three of these groups cosponsor and help guide the Gulf of Mexico Oil Spill and Ecosystem Science Conference; its priority is to provide a forum for discussion and presentation of scientific investigations concerning the Gulf of Mexico. We look forward to adding the state based Centers of Excellence and their respective state based RESTORE funding programs to our collaborative efforts and continue to leverage funds to maximize research and restoration efforts.



*Photo Credit: LSU Media Relations.*

# Presence for GoMRI Researchers at the 2014 International Oil Spill Conference

A number of researchers and students participated in the *International Oil Spill Conference 2014 (IOSC)* held May 5-8 in Savannah, Georgia. As a result, nine GoMRI Research articles, spanning multiple research consortia, were chosen from the presentations during the conference and published in the conference proceedings. (Research Board Chair, Rita Colwell comments on what such collaborative work means to GoMRI on [page 5](#).)

## [Biotic and Abiotic Oil Degradation after the Deepwater Horizon Disaster Leads to Formation of Recalcitrant Oxygenated Hydrocarbons: New Insights Using GCxGC Deep-C](#)

Aeppli, C.; Nelson, R.K.; Carmichael, C.A.; et al. (2014).

## [From Blowout To Beach: An Integrated Modeling Approach GISR](#)

Chapman, P.; Socolofsky, S.; Hetland, R. (2014).

## [Ecological connectivity in the Northern Gulf of Mexico - The Deep-C Initiative Deep-C](#)

Coleman, F.C.; Chanton, J.; Chassignet, E. (2014).

## [Overview of Research into the Coastal Effects of the Macondo Blowout from the Coastal Waters Consortium: A GoMRI Consortium CWC](#)

Hooper-Bui, L.M.; Rabalais, N.N.; Engel, A.S.; et al. (2014).

## [Biodegradation at the Seafloor: Ultrahigh Resolution FT-ICR Mass Spectral Characterization of Natural Petroleum Seeps Deep-C](#)

McKenna, A.M.; Williams, J.T.; Putman, J.C.; et al. (2014).

## [Oil source identification using diagnostic biomarker ratio analyses CWC](#)

Meyer, B.M.; Overton, E.B.; Turner, R.E. (2014).

## [Evaluation of triploid oysters as a tool to assess long-term seafood contamination of oil spill-impacted areas CWC](#)

Miles, M.S.; Malone, R.; Supan, J. (2014).

## [Oil source fingerprinting in heavily weathered residues and coastal marsh samples CWC](#)

Overton, E.B.; Miles, M.S.; Meyer, B.M.; et al. (2014).

## [Research Overview of the Consortium for Advanced Research on Transport of Hydrocarbon in the Environment CARTHE](#)

Ozgokmen, T.; Beron-Vera, F.J.; Bogucki, D.; et al. (2014).

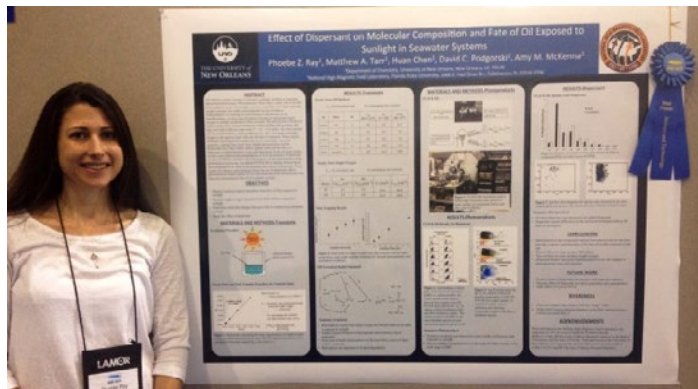
In addition, University of New Orleans (UNO) graduate student Phoebe Ray received an award for her poster presentation. Her poster, entitled "Effect of Dispersant on Molecular Composition and Fate of Oil Exposed to Sunlight in Seawater Systems," was the poster contest winner in the Science and Technology Category.



Check out this video showing how the use of drones during the Surfzone Coastal Oil Pathways Experiment (SCOPE) helped scientists from CARTHE study how oil moves from offshore onto our beaches! Using drones is an innovative approach to a complex problem with powerful results.



The video can be seen [here](#) and a blog post about the experiment can be found [here](#).



Phoebe Ray, Graduate Research Assistant in the Department of Chemistry at University of New Orleans, stands next to her poster at IOSC 2014. She won an award in the Science and Technology Category for her presentation. Photo Credit: Megan Gibney, Consortium for Ocean Leadership.