GULF OF MEXICO RESEARCH INITIATIVE

SPRING ISSUE 2018

NEWSLETTER

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

2018 Clean Gulf Conference
November 13-15, 2018
New Orleans, Louisiana

Bays and Bayous Symposium
November 28-29, 2018
Mobile, Alabama

Gulf of Mexico Oil Spill and Ecosystem Science (GoMOSES) Conference
February 4-7, 2019
New Orleans, Louisiana
Call for session proposals is now open! Deadline: July 1, 2018

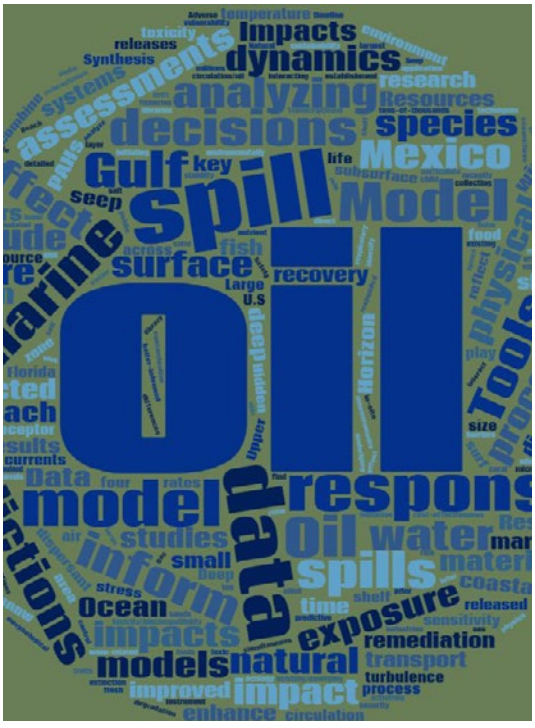

Photo Caption: In recognition of the eighth anniversary of the Deepwater Horizon oil spill on April 20, 2018, GoMRI published a synthesis article highlighting many of the new tools and technologies that will be produced in the next two years by RFP-VI-funded researchers. Read more on page five of this issue and here. Image Credit: Maggie Dannreuther.

GULF OF MEXICO RESEARCH INITIATIVE

SYNTHESIS & LEGACY

The Gulf of Mexico Research Initiative (GoMRI) will come to an end in 2020 after 10 years of dedicated research efforts to understand the impacts of the Deepwater Horizon oil spill. The GoMRI Research Board has begun to consider GoMRI's legacy and how to synthesize the program's scientific discoveries and results. In the next two years, GoMRI will work to address key questions and synthesize GoMRI research, an effort called Synthesis and Legacy. Key questions that will be considered are:

What was the state of the science ("baseline") before Deepwater Horizon?

What have we learned?

What major gaps in knowledge still exist?

How can we best apply what we have learned?

Where do we go from here?

The goal of GoMRI's Synthesis and Legacy efforts will be to "document scientific achievements and advances, with the idea that synthesis will lead to new understanding." The overall effort will include input from all members of the oil spill community, from the scientists to the responders and the user community. Synthesis and Legacy activities will be initiated both by the GoMRI Research Board and by the GoMRI-funded research consortia. To accomplish these objectives, core areas that align with GoMRI's five research themes have been identified by the Research Board, as well as guiding principles to maintain consistency throughout the process. The core areas are:

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Plume and Circulation Observations and Modeling

Fate of Oil and Weathering: Biological and Physical-Chemical Degradation

Ecological/Ecosystem Impacts

Human Health and Socioeconomic Impacts

Ecosystem Services, Human Health, and Socioeconomic Impacts

Microbiology, Metagenomics, and Bioinformatics

Integrated/Linked Modeling System

Workshops will be held in each of the core areas. Each workshop's focus and goals will differ depending on the topic area and based on the determinations of the workshop participants. However, each workshop will include approximately 25 to 30 participants and will consist of members of the GoMRI community and other researchers who have had research funded through the National Science Foundation Rapid Grants, the Natural Resource Damage Assessment, and other Deepwater Horizon-related funding. Where appropriate, the oil spill response community will also participate. The results of the workshops will be presented in open-access, peer-reviewed publications, ranging from single papers to special issues of journals. The workshops will begin in the fall of 2018 and continue throughout 2019.

Additionally, to ensure knowledge exchange with the user community, a working group has been established with members from the oil spill response community, non-governmental organizations, and the oil and gas industry. The working group will focus on lessons learned and operational advice for future spills.

In parallel to the synthesis efforts described above, the GoMRI-funded consortia will lead a diverse range of synthesis efforts. Combined with the synthesis workshop series and knowledge exchange working group, the totality of synthesis efforts will cement GoMRI's scientific legacy and improve society's ability to understand, respond to, and mitigate the impacts of petroleum pollution.

Updates on GoMRI's Synthesis and Legacy efforts will be highlighted in future GoMRI Quarterly Newsletters. Follow along on the Synthesis and Legacy website here for more information and details as results emerge.

Guest Frequently Asked Questions with Dr. Peter Brewer

Dr. Peter Brewer, GoMRI Research Board Member and co-chair of the GoMRI Data Management Committee, answered a few questions about the Gulf of Mexico Research Initiative Information and Data Cooperative (GRIIDC) and the legacy of GoMRI and GRIIDC's data policies.

Question: What is the GoMRI Data Management Subcommittee, and what has been your role as co-chair?

Answer: The GoMRI Research Board (RB) provides leadership and guidance to the overall GoMRI program. Initially the RB tended to act as a Committee of the Whole, but it was quickly realized that more specific assignments for RB members were needed. I happened to be tasked, along with the other Data Management Committee members David Halpern, Ken Halanych, Margaret Leinen, and Burt Singer, with oversight over our data management activities. We each brought different skills and backgrounds to this task. I did have some large program management experience both scientifically and administratively so this seemed to be a fair assignment. Initially this was confusing since everyone was newly acquainted, and a working basis had yet to be established. One important, very early event was a visit by GRIIDC Director Jim Gibeaut and colleagues from their home base at the Harte Institute for Gulf of Mexico Studies at Texas A&M University-Corpus Christi to my own lab in Moss Landing, California. This allowed ease of introduction and a common understanding of goals to be established on a personal basis. As Data Management Committee members, we have to work with both RB colleagues and the staff of the GRIIDC team. It has been a pleasure to do so.

Question: What are GoMRI's data sharing policies? What do you think are the most important aspects of those policies and why?

Answer: GoMRI's data sharing policies are not on their face remarkable. What is remarkable is that these were

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not already widely embedded in our ocean science community. The special funding and unique oversight provided by generous support from BP through the Gulf of Mexico Alliance (GOMA) has made possible enforcement of eminently sensible rules by the RB. When you publish a scientific paper, you are also implicitly publishing the actual data behind your arguments so that the truth can be directly observed. Unfortunately, the explicit implementation of this simple rule had become widely flouted; data sets had become large, and the old style printed list of numbers in a publication no longer works. And scientists had become accustomed to illusions of "MY data" and the excuse that they were just too busy to bother with requests for copies. GoMRI changed all that, and the timing just preceded the national awakening to the problem as identified in the May 9, 2013 Executive Order establishing a national open data policy. All those who are awarded research funding from GoMRI are informed in their award letter that they are bound by full data submission requirements and that the goal is to have the data supporting any and all publications openly available on the GRIIDC website the very day of publication. This allows scientific claims to be validated against the numbers and gives readers a chance to work with the data to test pet theories, investigate alternate explanations, or educate students by setting these data sets as class problems for study.

That this has sadly not been the norm in science was illuminated when, in frustration in comparing the success of GoMRI-GRIIDC to the attitudes of others, I wrote a piece for the American Geophysical Union's (AGU) Eos in a fit of pique. See: https://eos.org/articles/read-them-again-eoss-most-viewed-stories-of-2017 (Article #8). That article has now been viewed some 10,000 times!

What has been a pleasure is to see how happily this has all worked out with huge credit to the GRIIDC team for their gentle but firm coaching of principal investigators (PIs) and the careful way the path to success has been laid. It is only as a last resort that we inform researchers that we will cut off their funding if they do not comply; thankfully, this rarely, if ever, happens. We have made compliance relatively painless, and it works.

Question: How has GoMRI's data model, as executed by GRIIDC, advanced science and expectations of scientists?

Answer: The expectations of scientists have changed considerably, and for the better. Data archiving beyond one's personal data base is now the norm. So too has the expectation that you are not on your own here and that questions can be asked, advice given, and that common standards can be made to work very well. The GRIIDC team deserves huge credit here for immediately seeing their role as coach, teacher, and colleague - not as the enforcer. Initially there was a blizzard of questions, often messy: what about model output "data," what about instrument settings, at what level do we use "raw" data versus "processed" data, what about different versions of a data set, etc. All of these have had to be negotiated carefully and with a useful result. The very early insistence on metadata - the critical context within which measurements are made - has paid off handsomely. It is often the first point of entry into the system, and GRIIDC has handled this well.

Question: What will be the legacy of GRIIDC after the GoMRI program ends in 2020?

Answer: The Research Board is already planning for a form of continuation of GRIIDC in order to preserve the data legacy for several years (through 2030), although in a reduced role. One hopes that the lessons learned will endure, and that we will no longer have lost data when a PI retires or gets a new job offer and must walk away from the lab where the information was created. One hopes that a fully fleshed out picture of the Gulf will emerge as the GoMRI data are combined with other data resources, such as those from the Natural Resource Damage Assessment (NRDA) activities. This will require a merging of the GoMRI and federal data activities, and good people are working hard on that - although in the face of great organizational difficulties. One hopes that the remarkable results obtained with GoMRI funding can speak loud and clear to the better prediction of the consequences of another oil spill somewhere else in the world and sometime in the future. That means extracting the fundamentals from the observations - not always an easy task. One hopes that the interdisciplinary lessons learned endure: the mating of the molecular interfacial forces between oil and water with the large-scale physics of a plume or surface film, the ability to observe and predict the activities of microbes as they make chemical calculations on the energy available from a rapidly changing "food" supply, the real impact of added dispersants on the fate of the oil and on the organisms. All of these are addressed in some way in GoMRI research - and the details are recorded in the GRIIDC archives. This is the resource that problem solvers of the future must turn to.

Keep up with the Consortia Blog Roll and Social Media

Some of the GoMRI-funded consortia have updated their blogs. Check them out!

CARMMHA: News

CARTHE: Blog

DEEPEND: Blog

ECOGIG: News

The GoMRI-funded consortia are active on social media, including Twitter, Facebook, and Instagram. Follow along!

ACER: Facebook, Instagram

ADDOMEx: Facebook, Twitter, Instagram

CARMMHA: Facebook

CARTHE: Facebook, Twitter

C-IMAGE: Facebook, Twitter

CONCORDE: Facebook, Twitter, Instagram

CRGC: Facebook

CSOMIO: Facebook, Twitter

CWC: Facebook, Instagram

DEEPEND: Facebook, Twitter, Instagram

DROPPS: Facebook, Twitter

ECOGIG: Facebook, Twitter, Instagram

LADC-GEMM: Facebook

RECOVER: Facebook, Twitter

DISPATCHES *From the Gulf*

Screenscope Films recently hosted several regional screenings of *Dispatches from the Gulf 2*. The film was shown at the Gasparilla International Film Festival on March 24 in St. Petersburg, Florida and at the Salty Cinema IV Offshore Oil and Gas Film Festival, held at the Scripps Seaside Forum on April 5 in La Jolla, California. Several GoMRI-funded consortia also partnered with Screenscope to co-host regional screenings of the film in recognition of the eighth anniversary of the Deepwater Horizon oil spill on April 20. The Consortium for Advanced Research on Marine Mammal Health Assessment (CARMMHA) hosted a screening on April 20 at the San Diego Natural History Museum in San Diego, California. Following the film, GoMRI researchers Cynthia Smith from the National Marine Mammal Foundation whose research on bottlenose dolphins in the Gulf of Mexico is featured in the film, and Kait Frasier from the Scripps Whale Acoustic Lab, along with Forrest Gomez from the National Marine Mammal Foundation, Jacob James from the Waitt Foundation, and Nick Kellar from the National Oceanic and Atmospheric Administration's Southwest Fisheries Science Center, answered questions from the audience. A recording of the panel discussion is available here. The Consortium for Advanced Research on Transport of Hydrocarbon in the Environment (CARTHE) and the Relationship of Effects of Cardiac Outcomes in Fish for Validation of Ecological Risk (RECOVER) consortium jointly hosted a screening of the film on April 19 as a sister event to Smithsonian's Earth Optimism initiative. RECOVER principal investigator Dr. Martin Grosell and CARTHE researcher Dr. Guillaume Novelli participated in a panel following the film. More information on this screening can be found on CARTHE's Facebook page here and on RECOVER's website here.

Screenscope continues to share new short videos on their YouTube channel here; follow along on the GoMRI Twitter page using the hashtag #50shorts. If you are an educator, librarian, homeschooler, or community activist, or know someone who is, free copies of both *Dispatches from the Gulf 1* and *2* can be requested on the *Dispatches from the Gulf* website here. Additional resources, including an educators guide for both films, can be found on the *Dispatches from the Gulf* website here.

Photo Captions: (Left) CARTHE and RECOVER jointly hosted a screening of Dispatches from the Gulf 2 *on April 19 at the University of Miami. Photo Credit: CARTHE and RECOVER.*

(Right) CARTHE researcher Dr. Guillaume Novelli (left) and RECOVER principal investigator Dr. Martin Grosell (right) answer questions from the audience at the Dispatches from the Gulf 2 *screening hosted by CARTHE and RECOVER. Photo Credit: CARTHE and RECOVER.*

Science Corner

Published Science Highlights from the GoMRI Program

Study Gives Post-Oil Spill Baseline for Particle Fluxes in the Northern Gulf of Mexico

S.L.C. Giering, B. Yan, J. Sweet, V. Asper, A. Diercks, J.P. Chanton, M. Pitiranggon, U. Passow

Elementa Science of the Anthropocene, 2018, Vol. 6(1):6

Study Finds Oil, UV Radiation, and Temperature Affect Mahi Survival Processes

C. Pasparakis, L.E. Sweet, J.D. Stieglitz, D. Benetti, C.T. Casente, A.P. Roberts, M. Grosell

Aquatic Toxicology, 2017, Vol. 191, pgs. 113-121

Study Finds Small Scale Ocean Currents Cause Clustering of Floating Material

E.A. D'Asaro, A.Y. Shcherbina, J.M. Klymak, J. Molemaker, G. Novelli, C.M. Guigand, A.C. Haza, B.K. Haus, E.H. Ryan, G.A. Jacobs, H.S. Huntley, N.J.M. Laxague, S. Chen, F. Judt, J.C. McWilliams, R. Barkan, A.D. Kirwan Jr., A.C. Poje, T.M. Ozgokmen

Proceedings of the National Academy of Sciences of the United States of America, 2018, Vol. 115(6), pgs. 1163-1167

Study Assesses Fish Otoliths for Metal Exposure after Deepwater Horizon

J.E. Granneman, D.L. Jones, E.B. Peebles

Marine Pollution Bulletin, 2017, Vol. 117(1-2), pgs. 462-477

Study Reveals New Mechanism for Particle Attachment to Oil Droplets

L. Zhao, M.C. Boufadel, J. Katz, G. Haspel, K. Lee, T. King, B. Robinson

Environmental Science and Technology, 2017, Vol. 51(19), pgs. 11020-11028

Study Uses Big-Data Approach to Identify Distinct Dolphin "Clicks" in Acoustic Recordings

K.E. Frasier, M.A. Roch, M.S. Soldevilla, S.M. Wiggins, L.P. Garrison, J.A. Hildebrand

PLoS Computational Biology, 2017, 13(12): e1005823

Study Characterizes Dissolved Organic Carbon Cycling in the Northern Gulf of Mexico

B.D. Walker, E.R.M. Druffel, J. Kolasinski, B.J. Roberts, X. Xu, B.E. Rosenheim

Geophysical Research Letters, 2017, Vol. 44(16), pgs. 8424-8434

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

Note from the Research Board Chair

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

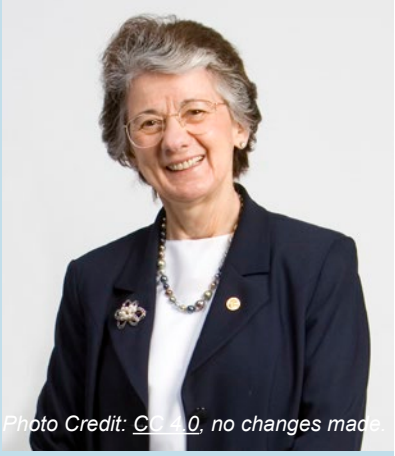

Photo Credit: CC 4.0, no changes made.

GoMRI Community Recognizes the Eighth Anniversary of the Deepwater Horizon Oil Spill

April 20, 2018 marked the eighth anniversary of the Deepwater Horizon oil spill. Each year on the anniversary, we remember the 11 people who lost their lives in this tragic event. With each anniversary, we also reflect on the contributions the GoMRI community is making to advance the state of knowledge of oil spill science. In eight years, GoMRI has facilitated six requests for proposals, funding nearly 4,000 researchers, including over 1,000 graduate students. As of 2018, GoMRI scientists have published a total of more than 1,000 peer reviewed journal articles and entered into the archives over 2,000 publicly available datasets. To commemorate the anniversary, an excellent summary of tools and resources that will be available from GoMRI-funded research was presented on the GoMRI website; the article can be read here.

Many GoMRI-funded consortia also marked the anniversary. A press release from the University of South Florida highlighted GoMRI and the scientific contributions made by the Center for the Integrated Modeling and Analysis of the Gulf Ecosystem (C-IMAGE), funded by GoMRI since 2011. Additionally, the Consortium for Advanced Research on Transport of Hydrocarbon in the Environment (CARTHE), the Relationships of Effects of Cardiac Outcomes in Fish for Validation of Ecological Risk (RECOVER), and the Consortium for Advanced Research on Marine Mammal Health Assessment (CARMMHA) recognized the anniversary by hosting local screenings of the *Dispatches from the Gulf 2* documentary (visit page four of this issue for more information).

While reflecting on the past, GoMRI continues to look to the future. GoMRI's Synthesis and Legacy efforts, a summary of which is provided on page one of this issue, will continue throughout the next two years of the program. The goal is to summarize and make available outcomes of this unprecedented research program so that the scientific and response communities can work together and be better prepared for any future spills. One of the ways that GoMRI plans to achieve this is through the recently released Request for Sample Analysis Funds, designed to complete the processing and analysis of samples on hand that might conclude hypothesis testing or allow exploration of new or unanticipated scientific questions or hypotheses. Please follow along on the GoMRI website and in these newsletters for updates and information as Synthesis and Legacy efforts progress.

GoMRI Researcher Interview with Dr. Andres Campiglia

Dr. Andres Campiglia from the University of Central Florida answered a few questions about his RFP-V project, *A Combined Analytical and Synthetic Approach Based on Line Narrowing Spectroscopy for Specific Isomer Determination of Petroleum Oil Spills*, and his work as a co-principal investigator on the RFP-VI project, *Biodegradation of "Hidden" High Molecular Weight Polycyclic Aromatic Hydrocarbons: Closing Critical Research Gaps*.

1. Thank you so much for talking with us! Tell us about your RFP-V research project, *"A Combined Analytical and Synthetic Approach Based on Line Narrowing Spectroscopy for Specific Isomer Determination of Petroleum Oil Spills."* What are the goals of your project?

The main goal of this project is to develop methodology for the analysis of polycyclic aromatic hydrocarbons (PAHs) in the Gulf of Mexico. PAHs are one of the main chemical components of petroleum. After the Deepwater Horizon (DWH) event, risk assessment in the Gulf of Mexico paid attention to the 16 PAHs listed in the priority pollutants list from the Environmental Protection Agency (EPA). The molecular weights (MW) of EPA-PAHs range from approximately 128 to 278 g mol^{-1}. Our project tackles a different aspect of PAHs analysis as it focuses on the detection and characterization of high molecular weight PAHs (HMW-PAHs), i.e., PAHs with MW equal or higher than 302 g mol^{-1}. Of particular concern is dibenzo[a,l]pyrene (DB[a,l]P, MW ≈ 302 g mol^{-1}), which is the most potent carcinogenic PAH yet reported. There are numerous possible HMW-PAH isomers of MW 302 g mol^{-1}. Unfortunately, established methodology fails to identify or quantify individual isomers of MW 302 g mol^{-1}. If the analytical characterization techniques cannot distinguish isomers, conclusions drawn from risk assessment studies could be seriously in error. Our purpose is to fill this gap.

2. You are also a co-principal investigator on the RFP-VI project, "*Biodegradation of Hidden High Molecular Weight Polycyclic Aromatic Hydrocarbons: Closing Critical Research Gaps*." Could you tell us about your work on this project?

Dr. Melanie Beazley (Department of Chemistry, University of Central Florida) is the principal investigator of this project, whose central goal is to understand the biological degradation pathways of HMW-PAHs. Microorganisms are the primary drivers of petroleum degradation in the environment. Previous studies have identified several bacterial species capable of degrading low molecular weight PAHs. Microbial interactions with HMW-PAHs remain unknown. Our role is to develop methodology for the trace analysis of degradation products of HMW-PAHs.

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

I am a chemist. I obtained my B.S. and M.Sc. degrees at the University of Brasilia and my Ph.D. degree at the University of Florida. My area of expertise is analytical chemistry. My interest in photoluminescence spectroscopy dates back to my undergraduate studies at the University of Brasilia. The ability to measure photoluminescence phenomena in broad-ranging applications from human health to the environment and criminal justice still fascinates me.

4. Can you talk a bit more about why HMW-PAHs are so difficult to detect and what makes them toxic?

Established methodology is based on chromatographic techniques. PAHs are separated in a chromatographic column containing a stationary phase, eluted from the column with a liquid or a gas mobile phase, and detected at the exit of the column with the aid of a mass spectrometry detector. PAHs with high affinity for the stationary phase tend to remain longer in the chromatographic column than PAHs with low affinity for the stationary phase. The time a PAH spends in a chromatographic column is known as the retention time of the PAH. Complete separation in the chromatographic column requires finding a set of experimental conditions that provides a specific retention time for each PAH in the sample. Unfortunately, numerous cases exist where two or more isomers of MW 302 g mol^{-1} co-elute from the chromatographic column. In addition to the same retention times, many co-eluting isomers with the same molecular weight present almost identical mass fragmentation patterns that yield undistinguishable detector responses.

Not all the isomers with molecular weight 302 g mol^{-1} are equally toxic. Their level of toxicity depends on their molecular structures, which present variations in the relative positions of their aromatic rings. Parent PAHs are biologically inert molecules but can become carcinogenic upon metabolic activation. A rich heterogeneous mixture of products

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is created by metabolism, and some of these can covalently bind to DNA in a process believed to be the first critical step in tumor formation. For instance, the metabolic activation of DB[a,l]P produces diol epoxides with strong affinity for DNA. Since the carcinogenic properties of these PAHs differ significantly from isomer to isomer, it is of paramount importance to determine the most toxic isomers, even if they are present at much lower concentrations than their less toxic isomers.

5. What are some of the most significant or exciting findings so far in your GoMRI-funded research?

We have developed analytical approaches that provide the unambiguous determination of co-eluting isomers with the same molecular weight. We have made this possible with the combination of chromatographic and vibrational spectroscopic techniques. Photoluminescence vibrational spectra generated at liquid nitrogen (77K) and liquid helium (4.2K) temperatures provide fingerprint identification of PAH isomers with identical mass spectra. PAH identification is confirmed by monitoring the intensity of the photoluminescence signal as a function of time (photoluminescence lifetime). We have extended the developed methodology to the analyses of alkylated-PAHs and polycyclic aromatic sulfur heterocycles (PASHs). We are able to detect all these pollutants at the parts-per-trillion concentration levels (pictograms/milliliter) in micro-litters of analytical sample.

6. What are alkylated-PAHs (APAHs) and polycyclic aromatic sulfur heterocycles (PASHs)? Are they similar or different than high molecular weight PAHs?

PAHs and APAHs are heterocyclic compounds with only carbon and hydrogen atoms in their molecular structures. APAHs are alkyl derivatives of parent PAHs. When compared to parent PAHs, APAHs comprise a relatively large fraction of the total number and mass of PAHs found in crude oil and crude-contaminated marine organisms. PASHs are heterocyclic compounds with carbon and hydrogen in which one or more carbon atoms are replaced by sulfur atoms. Sulfur is the principal heteroatom in coal, crude oil, tar, and their by-products. Some PASHs have shown similar mutagenic and carcinogenic potential to PAHs.

7. If funding were not an issue, what would you add to your GoMRI-funded projects?

Time. During the first two years of the project, we developed and validated the new methodology for HMW-PAHs, APAHs, and PASHs with the aid of standard reference materials from the National Institutes of Standards and Technology. We are now in a unique position to interact with other scientists involved in GoMRI. Our ability to track down specific isomers in complex environmental extracts could provide unique insights to understand the environmental impact of the DWH accident. Since not much is known on the long-term effects of these pollutants in the ecosystem, it is our hope to establish long-term interactions that go beyond the three-year duration of this project.

8. Can you describe your interactions with other GoMRI researchers?

The analysis of samples from the Gulf of Mexico through collaborations with scientists involved in GoMRI is an exciting component of our proposition. We have initiated a collaboration with Dr. Behzad Mortazavi and researchers from the Alabama Center for Ecological Resilience (ACER) consortium to analyze sediment cores collected at the Chandeleur Islands. We expect to do the same with water samples that will be collected this summer by Dr. Tracey Sutton and researchers from the Deep Pelagic Nekton Dynamics of the Gulf of Mexico (DEEPEND) consortium. We are seeking collaborations with researchers interested in the analysis of marine organisms as well.

The Relationships of Effects of Cardiac Outcomes in Fish for Validation of Ecological Risk (RECOVER) consortium recently released several new videos. The first two videos, *The Next Step in Mahi-Mahi Satellite Tagging: Mini Mahi Tags – Part 1* and *Tunnels and Tags: Mini Mahi Tags - Part 2,* are a part of a three-part series highlighting RECOVER's preparations for their upcoming research cruise in the Gulf of Mexico. *Part 1* discusses the methods RECOVER will use to "assess metabolic cost and behavioral changes in captive mahi that are carrying the satellite tags," and *Part 2* discusses the experiments that will be conducted to assess these changes. Check them out here and here, and stay tuned for *Part 3* coming soon.

RECOVER also released a 16-minute film highlighting their research cruise from June 2017 to catch, tag, and release wild mahi to collect information about their spawning, feeding, and migratory habits. Be sure to check it out here.

Don't forget to check out GoMRI's YouTube Channel here.

GoMRI Newsmakers

GoMRI Research Board Chair Dr. Rita Colwell was the distinguished lecturer at the University of Miami's (UM) Rosenstiel School for Marine and Atmospheric Science (RSMAS) Career and Leadership event in April 2018. Dr. Colwell was invited by GoMRI researcher Dr. Villy Kourafalou, Director of UM's A Seed for Success (SEEDS) program and Chair of the UM RSMAS Diversity, Equity, and Inclusion Committee. During the two-day event, Dr. Colwell spoke about her research and her experiences as a woman in the sciences, facing hurdles and breaking through barriers during her more than 60-year career. Participants praised Dr. Colwell for her inspiration and enthusiasm. GoMRI congratulates Dr. Colwell on being invited to be the distinguished lecturer during this event!

The Consortium for Advanced Research on Transport of Hydrocarbon in the Environment's (CARTHE) video *Drifting in the Gulf* won first place in the professional category in the 2018 Ocean 180 Video Challenge. The goal of the competition is "to engage non-scientists and students in timely and relevant ocean science research while inspiring scientists to effectively share their discoveries and excitement for research with the public." It is organized by the Centers for Ocean Sciences Education Excellence (COSEE) Florida and sponsored by COSEE, the National Science Foundation, and Bootcamps for Scientists. Ten videos were selected as finalists this year, which were judged by more than 25,000 middle school students from around the country. Visit the Ocean 180 Video Challenge website for the full list of winners. GoMRI congratulates all the finalists and winners, as well as the CARTHE team for having their video selected as a winner in this year's competition!

Photo Caption: "I was not going to be stopped," Dr. Rita Colwell told the audience during her presentation as the 2018 distinguished lecturer at the University of Miami's Rosenstiel School for Marine and Atmospheric Science Career and Leadership event. Photo Credit: Laura Bracken, CARTHE Program and Outreach Manager.

Education Spotlight

The Consortium for Advanced Research on Transport of Hydrocarbon in the Environment (CARTHE) recently partnered with the ANGARI Foundation and MetOcean Telematics on a professional development opportunity for K-12 educators. The ANGARI Foundation's mission is to promote "a global community that is interested, knowledgeable, and invested in marine and environmental sciences by directly supporting research initiatives that foster a greater trust and dialogue between scientists and the public." A leader in satellite communications, MetOcean Telematics supports the integration of Iridium hardware into unmanned surface vehicles, buoys, profilers, and more to ensure reliable data transmissions. The goal of the one-day event, which took place in late March 2018 in West Palm Beach, Florida, was to provide an opportunity for the educators to learn about drifters, how scientists use them to track ocean currents, and to inspire them to incorporate this type of science and technology into their curriculums. The event took place on the R/V *ANGARI*, and the educators were able to drop a drifter provided by MetOcean Telemetics into the Gulf Stream. The drifter can be tracked online (www.osmc.noaa.gov, WMO ID #4101559). More information on this collaboration can be found on the ANGARI Foundation website here and on their Facebook page here.

The Ecosystem Impacts of Oil and Gas Input to the Gulf (ECOGIG) consortium participated in the 2018 EarthX Expo, Conference, and Film Festival held in Dallas, Texas from April 13-22, 2018. EarthX, a nonprofit organization that focuses on environmental education and awareness, hosts an annual event to "celebrate progress, hope, and innovation" by bringing together environmentally-focused organizations, businesses, academic institutions, government agencies, and others to participate in a forum to share "the latest initiatives, discoveries, research, innovations, policies, and corporate practices that are reshaping our world." The event includes a three-day expo, five days of group conferences, and a 10-day film festival; last year, over 100,000 people attended the event. ECOGIG displayed their Ocean Discovery Zone booth during EarthX Expo, where they talked with visitors about ECOGIG's research on deep sea ecosystems. More information on EarthX, including photos from the event, can be found on the EarthX Twitter, Facebook, and Instagram pages and on the ECOGIG website here.

Sea Grant

Texas • Louisiana • Florida
Mississippi-Alabama

The Gulf Sea Grant Oil Spill Science Outreach Team recently released three new publications. The one-page fact sheet *Where Did the Oil Go?* shares information on where oil from the Deepwater Horizon spill went and what ultimately happened to it. Some of the oil accumulated at the sea surface; some traveled to the coasts of Gulf states including Texas, Louisiana, Mississippi, Alabama, and Florida; and some made it to the sea floor. The fact sheet includes a graphic depicting how much of each state's coastlines were impacted by the spill. Much of the oil was burned, skimmed, dispersed, or evaporated, and some accumulated in sea floor sediments; 11-25 percent of the oil from the spill remains unaccounted for. A second one-page fact sheet, *Helping Oiled Animals Recover: Gulf of Mexico*, highlights what to do to help an animal that has been injured in an oil spill. The fact sheet includes contact information for experts who can help in the event of an emergency, listed both by state and by the type of animal. It also includes a summary of how several species of marine animals fared during the Deepwater Horizon oil spill. *Microbes and Oil: What's the Connection?* discusses the role microbes play in degrading oil in the environment, from both natural seeps and oil spills such as the Deepwater Horizon. The publication describes the types of microbes that degrade oil and the chemical processes by which they break it down. It also discusses marine snow and how dispersants impact microbial degradation. To see all of the Gulf Sea Grant Oil Spill Science Outreach Team's publications, including reports and translated publications, visit their website here.

Emily Maung-Douglass from the Sea Grant Oil Spill Science Outreach Team led a breakout session at the Mid-Atlantic Sea Grant Programs' Regional Meeting on March 28 called *Break Glass in Case of Emergency*. The goal of the session was to share resources and response efforts by organizations (such as the U.S. Coast Guard and the National Oceanic and Atmospheric Administration) with Sea Grant Programs in the mid-Atlantic region to foster preparedness in the event of future oil spills. More information, including speaker biographies and an agenda, is available on the Gulf Sea Grant website here.

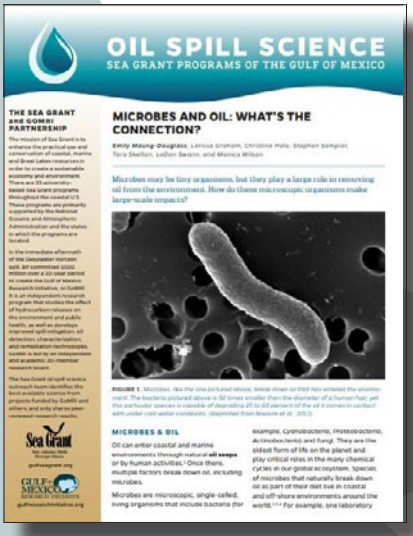

Image Credits: Gulf of Mexico Oil Spill Science Outreach Program.

GoMRI Scholars in Action

GoMRI recognizes the graduate students whose vital research contributes to improving understanding about the damage, response, and recovery from 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 research 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!

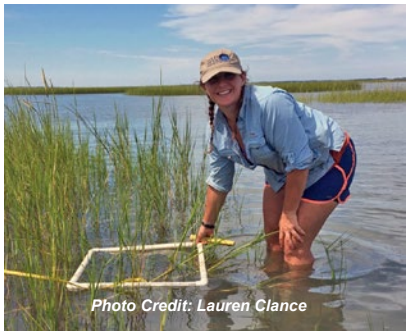
Photo Credit: Lauren Clance

Grad Student Ziegler Compares Gulf and East Coast Ecosystems for Predicting Saltmarsh Food Web Responses to Disturbances


Photo Credit: Nikaela Flournoy

Grad Student Flournoy Emphasizes the Importance of Student Exposure to STEM

Photo Credit: Kurt Rethorn

Grad Student Montgomery Explores How Ocean Chemistry Effects Microbes


Photo Credit: ECOGIG

Grad Student DeLeo Used Genetics to Explore Oil, Dispersant Effects on Deep-Sea Corals


Photo Credit: Rick Olivier

Grad Student Lichtler Examines Mammalian Cell Response to Oil Exposure


Photo Credit: RECOVER

How Grad Student Schlenker "Sniffs Out" Oil's Effect on Mahi-Mahi

Ocean Portal
ocean.si.edu

The Smithsonian Ocean Portal recently released a story map titled, *Where Did the Oil Go In the Gulf of Mexico?* The story map combines text, images, and maps to visually depict where the oil went following the Deepwater Horizon spill and what happened to it once it got there. Data to generate the maps was provided by the Gulf of Mexico Research Initiative Information and Data Cooperative (GRIIDC), the National Oceanic and Atmospheric Administration (NOAA), the Environmental Response Management Application (ERMA), the Bureau of Ocean Energy Management (BOEM), and others. The story map links to GoMRI-funded studies, and Ocean Portal articles throughout the text provide additional information. The article also references the Sea Grant Oil Spill Science Outreach Program's publication *Where Did the Oil Go?* Check it out here!

Photo Caption: Smithsonian Ocean Portal releases new story map article, called Where Did the Oil Go In the Gulf of Mexico? *Image Credit: Smithsonian Ocean Portal.*