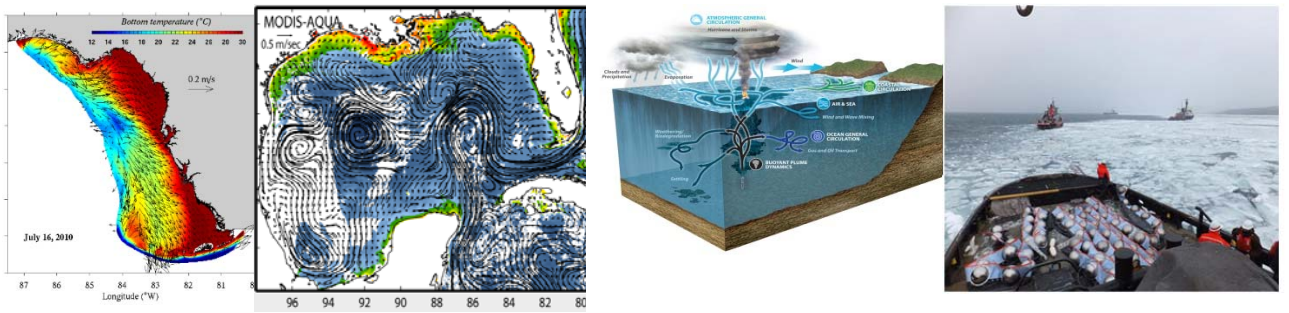

Discussion on Research Priorities in Relation to Federal Oil Spill Response and Restoration

A Meeting between Federal Agencies and GoMRI Consortia

June 27 & 28, 2013

University of South Florida

St. Petersburg, Florida

Center for Spills in the Environment

ACKNOWLEDGEMENTS

This workshop was hosted by the Center for Spills in the Environment (CSE). The CSE was created in 2004 in conjunction with its affiliate, the National Oceanic and Atmospheric Administration (NOAA)-funded Coastal Response Research Center (CRRC). CSE focuses on issues related to hydrocarbon spills. Both centers are known for their independence and excellence in the areas of environmental engineering and marine science as they relate to spills. CSE has conducted numerous workshops bringing together researchers, practitioners and NGOs of diverse backgrounds to address issues in spill response, restoration and recovery.

The content for this workshop was developed by an organizing committee of University of South Florida Steven Murawski, David Hollander and Sherryl Gilbert; and Nancy Kinner, Center for Spills in the Environment.

The Center thanks the C-Image Consortium of GoMRI for its support of this meeting, especially Sherryl Gilbert and the staff from the College of Marine Sciences at the University of South Florida, St. Petersburg campus.

List of Consortia and Other Acronyms

ADIOS3	Automated Data Inquiry for Oil Spills
C-IMAGE	Center for Integrated Modeling and Analysis of the Gulf Ecosystem
CARTHE	Consortium for Advanced Research on Transport of Hydrocarbons in the Environment
CSE	Center for Spills in the Environment
CRRC	NOAA-funded Coastal Response Research Center
DROPPS	Dispersion Research on Oil- Physics and Plankton Studies
ECOGIG	Ecosystem Impacts of Oil and Gas Inputs to the Gulf
EPA	United States Environmental Protection Agency
GISR	Gulf Integrated Spill Research Consortium
GoMRI	Gulf of Mexico Research Initiative
GRIIDC	GoMRI Research Initiative Information and Data Cooperative
NOAA	National Oceanic and Atmospheric Administration
NODC	National Oceanographic Data Center
OR&R	NOAA's Office of Response and Restoration
R&D	Research and Development
USCG	United States Coast Guard

Meeting Organization and Participants

This meeting, entitled "Discussion on Research Priorities in Relation to Federal Oil Spill Response and Restoration," was hosted by the Center for Spills in the Environment on June 27-28, 2013 at the University of South Florida, St. Petersburg. The meeting consisted of presentations on current research conducted by Gulf of Mexico Research Initiative (GoMRI) consortia and federal agencies. After each presentation, participants could ask questions and discuss the research. After all the presentations, there was a final wrap-up discussion session which addressed moving forward and highlighted specific research needs. The objectives of the meeting were to:

- Bring together representatives of federal agencies and researchers of GoMRI
- Have federal and GoMRI affiliated researchers present their research and critical needs
- Discuss recent key research findings regarding oil modeling, fate and effects; including flocculation/sedimentation of oil and dispersed oil.

Participants attended in person or remotely via WebEx. Individuals from the GoMRI consortia represented the: Center for Integrated Modeling and Analysis of the Gulf Ecosystem (C-IMAGE); Deep-C; Dispersion Research on Oil- Physics and Plankton Studies (DROPPS); Consortium for Advanced Research on Transport of Hydrocarbons in the Environment (CARTHE); Ecosystem Impacts of Oil and Gas Inputs to the Gulf (ECOGIG); Gulf Integrated Spill Research Consortium (GISR); GoMRI Research Initiative Information and Data Cooperative (GRIIDC); and research institutes at University of South Florida, St. Petersburg; Rosenstiel School of Marine & Atmospheric Science (RSMAS) at the University of Miami; University of Texas, Austin; Texas A&M; Florida State University; Technische Universitat Hamburg- Harburg (TUHH); and the University of California, Santa Barbara. Individuals from the federal government represented the National Oceanic and Atmospheric Administration's (NOAA) Office of Response and Restoration (OR&R), U.S. Coast Guard (USCG), Bureau of Safety and Environmental Enforcement (BSEE), and the U.S. Environmental Protection Agency (USEPA). State agencies represented were Florida Fish and Wildlife Conservation Commission. Independent researchers participated from SINTEF in Norway; University of Western Australia; Eckerd College, Florida; Industrial Economics Inc.; and Wageningen University.

Presentations and Discussion

Initial presentations reviewed the objectives of the meeting and introduced to the Center for Spills in the Environment (CSE) and GoMRI. The subsequent presentations were on current research from each GoMRI consortium, federal, and independent agencies.

The C-IMAGE consortium focuses on diagraming spill and plume dynamics including:

- Near-field and far-field modeling
- High pressure experiments
- Indicators of sedimentary oil deposition and its biodegradation
- Surface oil dispersion
- Degradation and ecotoxicology
- Impacts on plankton, benthic ecosystem, fish and marine mammals

- Ecotoxicology
- Ecosystem modeling
    - Oil-topography interactions
- Quantifying oil exposure.

The Deep-C Consortium focuses on the mechanisms of sedimentary oil deposition including:

- Sediment analysis
- Flocculation and sedimentation
- Hydrodynamic processes in Northeast Gulf of Mexico and connection with oil and dispersed oil
- 3D modeling including exchange between sediment, water and atmosphere
- Oil and gas effects on biogeochemical processes
- Oil fate and tarballs
- Evaluation of biodiversity and trophic interactions.

The GISR consortium focuses on modeling and predicting the behavior of oil in the marine environment by:

- Modeling oil and gas released into the environment
    - Bay modeling
    - Shelf modeling
    - Deep Sea
- Model validation using laboratory plume experiments .

The DROPPS Consortium research focuses on fate of petroleum from a physical and biological perspective, including:

- Distribution, dispersion, dilution of petroleum subjected to physical processes
- Chemical evolution and biological degradation from marine bacteria and plankton
- Small scale processes linked to mesoscale with mesocosms and modeling.

The ECOGIG consortium researches flocculation and sedimentation, focusing on:

- Marine Oil Snow Sedimentation and Flocculant Accumulation (MOSSFA)
- Formation of marine snow with oil and dispersed oil
- Sediment traps and composition
- Microbial community composition fluctuations.

The CARTHE consortium researches plume dynamics and dispersant application during the Deepwater Horizon Incident. Their research includes:

- Effectiveness of physical mixing
- Optimal dispersant injection techniques
- Modeling the mixing of dispersants and the plume
- Modeling transport and comparing to surface drifter data.

The USCG presented on an ongoing project to identify oil spill research needs, conducted by the Interagency Coordinating Committee on Oil Pollution Research (ICCOPR) and three additional research areas including:

- Recovery of heavy oil
- Response to oil in ice
- Detection and collection of oil within the water column.

The objectives of the USCG ICCOPR are to:

- Prepare a comprehensive, coordinated Federal oil pollution research and development (R&D) plan focusing on R&D needs in four categories:
    - Preparedness
    - Prevention
    - Response
    - Injury Assessment and Restoration
- Promote cooperation with industry, universities, research institutions, State governments, and other nations through information sharing, coordinated planning and joint funding of projects.

NOAA's Office of Response and Restoration's research and development focus areas are:

- Modeling fate and transport
    - Develop tools for operational use during incidents
- Understanding dispersant physical and toxicological behaviors
- Investigating emerging threats
    - Oil Sands
    - Underwater wreck
- Contaminant effects on marine mammals
- Toxicity testing on early life stages of keystone/sensitive species coupled with evaluation on gene expression
- Evolving the management, exploration and interpretation of data
    - Data management and archived data
    - Environmental Response Management Application (ERMA®).

Three CRRC funded research projects involve:

- Dtox: A database of toxicological effects of dispersants and chemically dispersed oil
- Chronic impacts of dispersants and chemically dispersed oil on behavior, molting success, and hormone status of blue crab larvae for recruitment and population models
- Response risk communication tools for dispersants and oil spills.

The EPA's research includes:

- Developing a standard, reproducible and repeatable protocol for testing effectiveness of solidifying an oil slick on water
- Developing a standard, reproducible and repeatable protocol to evaluate surface cleaning efficiency of surface washing agents
- Four different decision rules for dispersant application for two oils and two temperatures
- Bioremediation agents for two oils and two media (seawater and freshwater)
- Biodegradation of biodiesel blends under aerobic and anaerobic conditions
    - Soybean oil
    - Canola oil

    - Flaxseed oil
- Wave tank research analyzing subsea physical and chemical dispersion at high velocity
- Biodegradation and toxicity of diluted bitumen (dilbit).

GRIIDC was established by GoMRI to meet their requirement of assembling all consortia data, results and projects into a database. The database must:

- Be a fully accessible database for results and metadata
- Ensure all data are accessible with minimum time delay
- All data submitted to national database centers.

Moving Forward

After all of the presentations on each entity's current research, critical research gaps were discussed. The results of that discussion are briefly discussed in this section.

General discussion included GoMRI's upcoming request for proposals, which would greatly benefit from knowledge of the new R&D needs in the new ICCOPR report. This would be a way for the GoMRI research funded in the future to meet the priorities denoted by the federal government via ICCOPR. Deep well blowouts are rare events and research on the Deepwater Horizon is beneficial, however, there has to be more data collected on other types of incidents, oils, and under different conditions. The National Oceanographic Data Center (NODC) may be a natural place to consolidate and archive all past, present and future data on the Deepwater Horizon. Other general points, critical gaps and needs addressed during the final discussion included:

- Knitting together all data sets and approaches within the consortia
    - Consistent and well documented approach
- Providing supplemental and/or supporting data for modeling
- Considering alternative hypothesis to research
- Accounting for oil in the environment from Deepwater Horizon
- Transforming science into policy
- Modifying the oil budget bar graphs to include uncertainty
    - Refine it to include tarballs
- Updating dispersant research to address and explain what was seen on scene
- Conducting more research into background and baselines conditions
- Including research on the geology of seeps
- Improving high resolution near-shore modeling
- Conducting more research on effects of oi and dispersed oil.

Research Needs

Twelve research needs were highlighted throughout the discussion sessions after each presentation and in the final group discussion. The research needs are listed below:

1. Conduct research involving the application of dispersants at high pressure and low temperatures with the potential for lots of turbidity

2. Conduct research on dispersants, oil only, and dispersed oil interactions with algae, sediments and particles
3. Conduct research on benthic species interactions with oil, oil/dispersants and dispersant contaminated sediments
4. Study the impact of flocculation on oil and dispersants
5. Conduct research on toxic effects of oil, dispersants and oil with dispersants
6. Develop high resolution near shore models
7. Develop biodegradation models for incorporation into ADIOS3
8. Conduct research on the baseline sediment loads in the Gulf of Mexico
9. Study the formation of marine snow and its role in oil spills using different oils and convicting field experiments
10. Develop a unified structure all data sets and approaches within GOMRI so all consortia have consistency and documentation that can be available to other researchers
11. Develop the "oil budget" as a response tool
12. Collect ecological baseline information and construct a long term dataset of condition of relevant ecosystems prior to spill incidents.