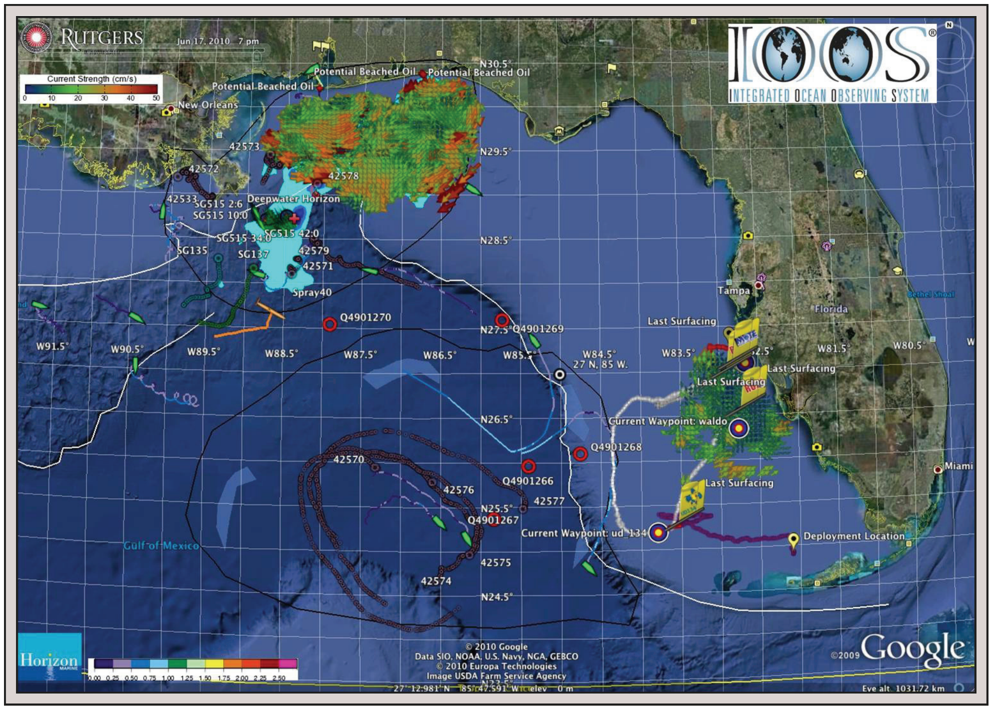
IOOS® INTEGRATED OCEAN OBSERVING SYSTEM

# IOOS® in Action: Deepwater Horizon Oil Spill Response

## Aiding Response to Environmental Disasters




**Overview:**
On April 20, 2010, BP's Deepwater Horizon Oil Rig Platform exploded 40 miles southeast of Louisiana, unleashing the largest offshore oil spill in U.S. history. This paper focuses on how the regional component of the U.S. Integrated Ocean Observing System (IOOS) immediately supported the Federal Government's massive response.

IOOS is a Federal-Regional partnership expanding the network of data observation tools and technologies, as well as making data easier to access and use. The regions are comprised of state, local, and tribal governments, as well as academic institutions, private industry, and nonprofits.

IOOS ability for rapid response stems from U.S. IOOS program actions to transform local efforts into a national capacity. A five-year effort to introduce IOOS capability and develop trusted relationships with Federal Response agencies allowed IOOS to spring to action when the crisis occurred.

IOOS regions quickly deployed new observing technologies. Unmanned, underwater robots called gliders and shore-based high frequency radar stations monitored for and tracked oil at various levels within the water column and on the surface. These technologies saved resources and improved safety by reducing the number of people sampling from surface vessels.

IOOS effectively assimilated, analyzed, and disseminated data and information to improve spill response decision making and public understanding. Through its regions, IOOS improved scientific models and imagery for responders and communicated observations and analyses via web sites, data portals, meetings, and on-scene expertise.

**Underwater Robots:**
IOOS members in the Mid-Atlantic, Gulf Coast, Southern California, and Southeast regions deployed a fleet of seven gliders equipped with sensors to help indicate the presence of oil in the water column. Though scientists still used water sampling to confirm oil presence and source, gliders narrowed the search zone for subsurface oil, and helped answer key questions about potential movement of oil.

Gliders also measured additional variables to inform ocean models used by emergency response teams. Glider technology is unique in that it collects data throughout the water column at low cost and at no risk to human life. Deepwater Horizon was the first U.S. oil spill response to apply this technology.

**Shore-based Radar Stations:**
IOOS utilized high-frequency radar technology to measure surface

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current speed and direction in near real time for the duration of the oil spill response efforts. Crews used regionally-operated IOOS radars in the Gulf Coast and Southeast at sites along Florida's West Coast and the northern Gulf to monitor the oil's surface travels.

NOAA immediately used these data to provide science-based daily oil trajectory maps. Because IOOS members in Southern California previously worked with NOAA on a five-year effort to develop usable formats for high frequency radar data, this effort proved seamless when needed most.

**Assimilation and Dissemination:** IOOS assimilated real-time data from gliders, drifters, and high frequency radar into Navy and NOAA models to assist in understanding how and where oil moved through the water column. These data proved crucial as decision support information for the Unified Command, who staged and transported shoreline protection and oil capture activities. Managers and officials in coastal communities also used the information to prepare for oil hitting the shoreline as well as to inform fisheries closure decisions.

Mid-Atlantic IOOS members established a web portal to share all regional IOOS data. This provided the Federal Government with a single location to access data and display daily visuals of glider, drifter and high-frequency radar assets.

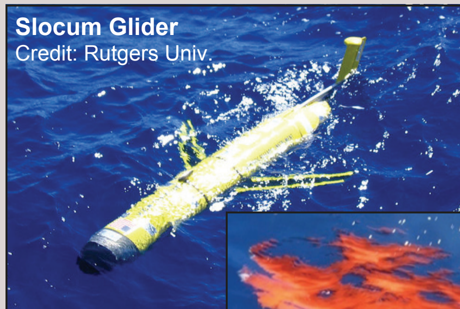
**Modeling and Imagery:** During Deepwater Horizon, a key concern centered on how much oil was in the water column. To address this issue, NOAA relied on a number of models to make the best forecast. Models provided by NOAA, the Navy and IOOS regions created a comprehensive view of regional ocean circulation patterns. Satellite imagery played a key role in the response. Southeast IOOS members provided image-derived products for sea surface temperature and surface circulation patterns to improve federal government imagery analysis. With model output overlaid on imagery and high frequency radar data, scientists then verified forecasts and refined their accuracy.

**Supporting Unified Command:** IOOS oceanographic experts temporarily relocated from around the country to work at the Unified Command Center for the duration of the response. These scientists assisted day-to-day operations, providing access to both Federal and non-Federal assets and data. IOOS scientists led the Unified Command's Subsurface Monitoring Unit and proved instrumental because of their experience in combining the many fields of expertise required for integrated ocean observing (observations, data management, modeling, evaluation, data exposure).

**IOOS Mobilization:** Sustained observations must be in place prior to emergencies so responders understand ocean conditions before, during, and after an event.

Deepwater Horizon proved the IOOS community can rapidly deploy cost effective sampling platforms such as gliders and high frequency radar stations to quickly support and adapt to changing needs. These technologies also have the built-in safety advantage of limiting scientist and responder exposure to potentially hazardous materials and dangerous ocean conditions.

**High Frequency Radar**
Credit: Bodega Marine Lab (Chris Harley)

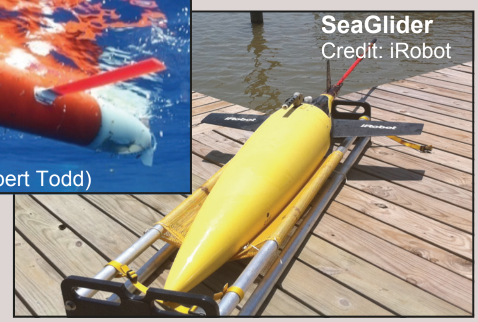


**Slocum Glider**
Credit: Rutgers Univ.

**Gulper AUV**
Credit: MBARI

**Spray Glider**
Credit: Scripps/UCSD (Robert Todd)

**Wave Glider**
Credit: Liquid Robotics



**SeaGlider**
Credit: iRobot

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