

## What is GCOOS/IOOS?

The Gulf of Mexico Coastal Ocean Observing System (GCOOS) is the Gulf regional component of the U.S. Integrated Ocean Observing System (IOOS). NOAA is the lead for IOOS, which provides 24/7 environmental intelligence for the U.S oceans for a broad base of stakeholders. *Environmental Intelligence* is timely, actionable, reliable information from authoritative science giving us foresight about future conditions and informing decision-making (NOAA, 2013).

## What is National Energy Security?

Over 30% of U.S. energy production and 40% of petroleum refining resources are located in the Gulf of Mexico (EIA, 2013), with more anticipated, and these are at risk from a broad range of threats, including weather (hurricanes, tropical storms, Loop Current changes, long-term ocean change), land subsidence, and terrorism. Damage to these energy resources incur high economic and ecological costs and threaten our Nation's Energy Security. This flyer focuses specifically on weather threats and how GCOOS/IOOS helps reduce the impacts of those threats through environmental intelligence.

## What is at Risk?

- With increasing intensities and frequency of storms since 1995 due to the Atlantic Multi-decadal Oscillation that enhances storm formation in the Atlantic Basin, our Nation's energy resources are increasingly at risk to physical disruption, damage, and oil spills from storms.

- **30,000 offshore personnel**
- **3000+ fixed oil and gas platforms in the Gulf, with more mobile units (300+) (Figure 1.)**
- **Thousands of miles of pipeline, through which over 2.6 million barrels of crude oil traverse the Gulf Coast each day, with over 1.5 million barrels going through a single point, Port Fourchon, each day (Figure 1.)**
- **4 US Strategic Petroleum Reserve underground storage facilities, each holding over 300 million barrels of crude oil**
- **More than 40 refineries and 84 natural gas processing plants**
- **Louisiana Offshore Oil Port, the only port in the U.S capable of off-loading deep-draft tankers (EIA, 2013a)**

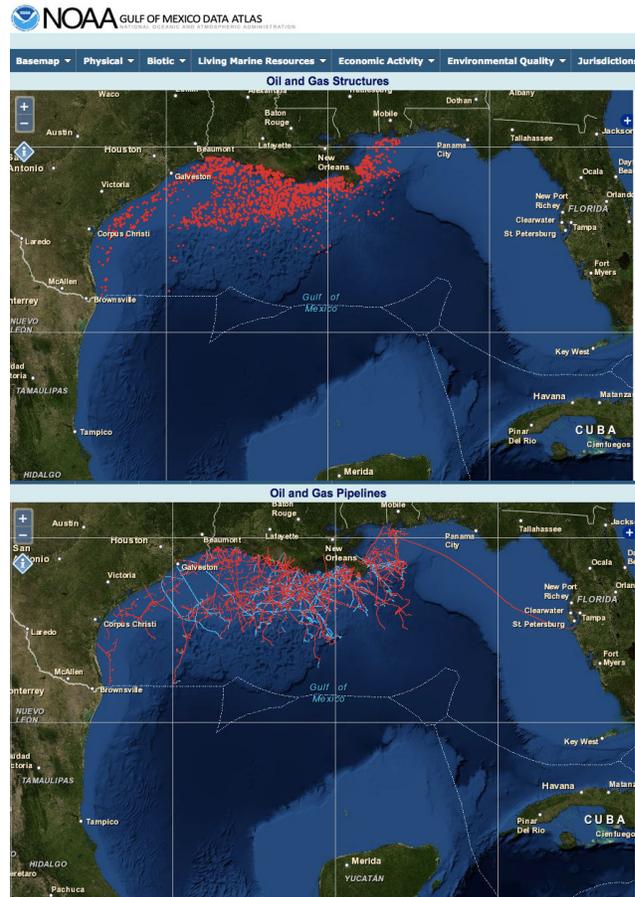


Figure 1. U.S. Energy Industry at Risk – Oil and gas structures and pipelines in the Gulf of Mexico

<http://www.ncddc.noaa.gov/website/DataAtlas/atlas.htm>

- 2005: Hurricanes Katrina and Rita destroyed 115 offshore platforms, damaged 52 others, and ruined 535 pipeline segments, causing a shut-down for weeks. 9 months after the hurricanes, 22% of oil production and 13% of gas production remained offline, equating to the loss of 150 million barrels of oil and 730 billion cubic ft. of gas from domestic (BSEE, 2012a).
- 2012: Nearly 30,000 offshore personnel evacuated, with 23% of the U.S. oil and gas exploration & production shut down, at \$130M USD/day (OGJ, 2013). Offshore oil output was reduced by more than 13M barrels over an 18-day period, and offshore Gulf natural gas output was curtailed by 28 billion cubic ft. (BSEE, 2012b).
- Seasonal losses can reach \$3.25 B USD, with an annual average of 5-6 named storms (assuming \$100/barrel price)
- By 2030, nearly \$1 trillion in energy assets will be at risk from more intense hurricanes & rising sea levels. The Gulf energy sector faces an annual loss from extreme weather/climate of \$8B in 2030 (Entergy, 2010).

# Environmental Intelligence Provided by GCOOS/IOOS

The Bureau of Safety and Environmental Enforcement (BSEE) reported that great strides have been made in reducing weather disruptions to our Nation's energy security, primarily due to increased environmental intelligence available from NOAA for enhanced forecasting, and protective measures by the industry (Figure 2.)

## Return to Production: 2005 vs 2008

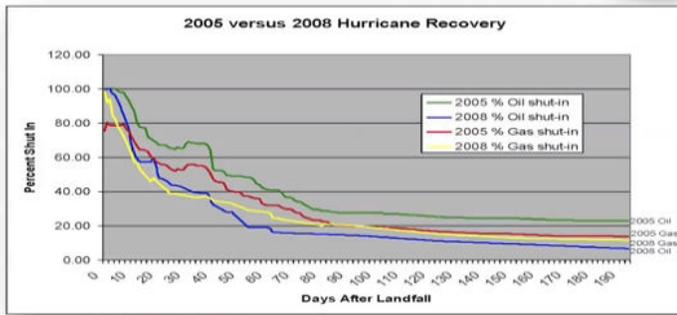


Figure 2. Enhanced Hurricane Recovery by the Gulf of Mexico Energy Industry, 2005-2008 (BSEE)

## GCOOS/IOOS are contributing to, and expanding, this bank of environmental intelligence in the following ways:

- Providing through the GCOOS Data Portal 24/7 observations related to hurricane intensity and Loop and associated currents, including wave, current, surge and upper ocean temperature (Figure 3.), and coordinating with NOAA to make these data available to NWS forecasters via the Global Telecommunications Service;
- Working with partners to provide model results on Sea Surface Height Anomalies, Loop Current changes, wind fields, circulation, and more from a central GCOOS website (Figure 4.);
- Advocating for data on currents from the oil and gas industry via the MMS (now BSEE) Notice to Lessees; these industry data are now available centrally, publicly, and freely through NOAA NDBC and GCOOS Data Portal;

References:

- BSEE (Bureau of Safety and Environmental Enforcement). 2012a. Technology Assessment & Research (TA&R) Project Categories: Hurricane Katrina and Rita Projects.
- BSEE. 2012b. Tropical Storm/Hurricane Isaac Information.
- EIA (U.S. Energy Information Administration), 2013a, Gulf Data EIA, 2013b, Gulf of Mexico Fact Sheet
- NOAA, 2013. Dr. Kathryn Sullivan at BSEE 2013 Hurricane Preparedness Workshop
- OGJ (Oil and Gas Journal), 2013, Hurricane Isaac Shuts in Oil
- SSPEED (Severe Storm Prediction, Education, and Evacuation from Disasters), 2013.



Figure 3. The GCOOS Data Portal – 24/7 real-time ocean and meteorological observations <http://data.gcoos.org>

- Documenting broad support for the need for more weather and ocean observations (stakeholder- and expert-identified observational infrastructure needs over a 10-year period in the GCOOS Build Out Plan (BOP); integrated priorities include the need for real-time hurricane intensity information);
- Providing HF radar data on currents, which can be combined with AIS for vessel tracking near critical ports to protect critical Gulf infrastructure and people. The GCOOS BOP includes proposed (unfunded) HF radar near all the other critical Gulf ports, including Port Fourchon, the primary port for the energy industry in the Northern Gulf;
- Supporting and working to expand the Shell-NOAA glider collaboration initiated in response to the 2005 Gulf hurricane season. Near real-time data from gliders may improve hurricane intensity forecasts;
- Working with BOEM and Louisiana State University to document the economic benefits of Gulf of Mexico ocean observing.



Figure 4. GCOOS data products are available from <http://www.gcoos.org/products>

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