OAR's OIL SPILL RESEARCH
Deepwater Horizon

Strengthening science across NOAA

Conducting and sharing science to inform response and restoration

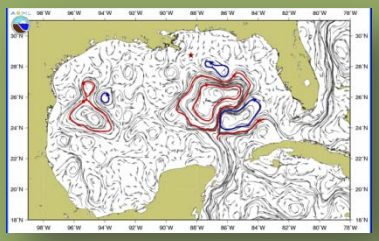
Academic Partnership Highlight

Oceanographers Nelson Melo of NOAA-funded Cooperative Institute of Marine and Atmospheric Sciences (CIMAS) and OAR's Atlantic Oceanographic and Meteorological Laboratory (AOML) and Tom Lee of the University of Miami deploy a drifter during the June 6-10, 2010 cruise of R/V *F.G. Walton Smith* from Gulfport, LA to Miami, FL. The main goal of this cruise was to collect observational data about the presence or absence of oil and tar balls in offshore regions where connectivity to the Loop Current might enable transport of these materials to South Florida and out of the Gulf of Mexico. Ship time was provided at no cost to NOAA by the University of Miami and the National Science Foundation. (Photo credit: NOAA/AOML)

NOAA research conducted through the Office of Oceanic and Atmospheric Research (OAR) played a vital role in delivering data and information that helped responders make critical decisions during the BP Deepwater Horizon oil spill. For instance, OAR's Atlantic Oceanographic and Meteorological Laboratory in Miami, FL, provided **daily maps on loop current and eddy locations in the Gulf** for NOAA's Office of Response and Restoration.

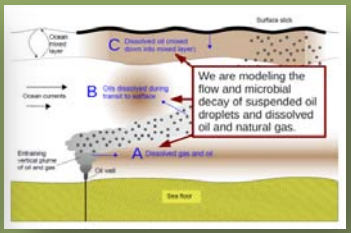
Today, OAR continues to conduct and share the science needed to monitor and restore the Gulf and develop innovative tools and technologies to explore and understand Gulf ecosystems. Sustained monitoring and research remain critical tools for oil spill response, recovery, and restoration.

Where was the oil going?



Loop Current Prediction

What might be happening to the oil under the water's surface?



Underwater Oil Detection & Modeling

How did burning affect air in the Gulf?

Air Chemistry Assessment

How did we help Gulf residents?

Sea Grant Outreach

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Loop Current Predictions

Where was the oil going?

Monitoring the connectivity between the loop current and an eddy that detached from it was critical to assessing the danger of oil and tar balls being carried into the Florida Keys and Atlantic Ocean. The loop current is a stream of warm Caribbean water that enters the Yucatan Straits, meanders northward, sometimes extending to the Gulf Coast, and exits into the Florida Straits after a sharp turn around the Florida Keys where it becomes the Florida Current. OAR scientists from the Atlantic Oceanographic and Meteorological Laboratory aboard NOAA Ship *Nancy Foster* collected the data critical to an early warning to the Florida Keys National Marine Sanctuary and other resource managers and scientists should the oil spill arrive at sensitive ecosystems in the region.

Underwater Oil Detection and Modeling

What might be happening to the oil under the surface?

While scientists sponsored by NOAA and university partners documented the extent of oil movement resulting from Deepwater Horizon, ocean modelers from OAR's Geophysical Fluid Dynamics Laboratory (GFDL) and NOAA's Office of Response and Recovery (OR&R) explored the probable extent of toxic concentrations of dissolved oil and of significant deep (1000-1300 m) oxygen depletion arising from the Deepwater Horizon spill. Using a high-resolution global ocean climate model and taking into account the microbial oxidation of oil, scientists from GFDL and OR&R showed that when ocean circulation and microbial oxidation rates are taken into account, the interior ocean hypoxia (oxygen depletion) or toxic concentrations of dissolved oil arising from the Deepwater Horizon blowout are likely to be locally significant but regionally confined to the northern Gulf of Mexico. The study was published in. the September 23, 2010 issue of *Geophysical Research Letters.*

http://www.gfdl.noaa.gov/simulations-of-underwater-plumes-of-oil-in-the-gulf-of-mexico

Air Chemistry Assessments

Investigating smoke and pollutants in the Gulf

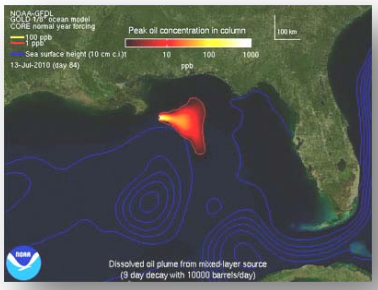
As a part of a multi-agency response to the Deepwater Horizon spill, OAR conducted an air quality assessment of samples taken during June, when oil was actively flowing from the well. A hurricane hunter aircraft equipped with sensitive air quality sampling instruments collected samples near and downstream from the spill area from lower layers of the atmosphere typically where pollutants are trapped. Compared to areas relatively unaffected by the spill, concentrations of certain hydrocarbons in areas 9.3 to 43.5 miles downwind from the spill were much higher than those in typical polluted air. Large amounts of black carbon were identified in smoke from a controlled burn. Nearshore areas 18.6 to 24.0 miles from shore were generally lower in concentration of pollutants than those typically found in urban areas. From a research perspective, these data inform NOAA's air quality modeling associated with the Deepwater Horizon oil spill, and complemented air monitoring on ships in the vicinity of the oil spill as well as EPA's ASPECT air quality surveillance airplane mission.

http://www.noaanews.noaa.gov/stories2010/PDFs/NOAA_P3_Gulf%20Mission%20Report_final.pdf

OBSERVATIONS

NOAA Ship *Nancy Foster monitored the loop current and collected baseline ecosystem samples during the early months of the spill. (Photo credit: NOAA)*

MODELING



Animations of underwater plume simulations based on models described in this study.

ASSESSMENTS

A hurricane hunter plane outfitted as an atmospheric chemistry lab was critical to air quality studies in the Gulf of Mexico during Deepwater Horizon. (Photo credit: NOAA)

Reaching Out to Gulf Communities – SEA GRANT COLLEGE PROGRAMS

Peer listening workshop at Louisiana State University (LSU) and hosted by LSU School of Social Work, Louisiana Sea Grant, Mississippi-Alabama Sea Grant Consortium, and LSU AgCenter

- Hosted more than 60 meetings and public forums involving more than 5,000 stakeholders and citizens from the region (Gulf Sea Grant programs)
- Organized a working group, the Fisheries Assessment and Seafood Team, to provide guidance and coordination on seafood safety, fisheries closures, and approaches to re-opening closed fisheries
- Engaged legal and extension specialists with fishing communities
- Shared information through national experts and regional website
- Developed a web-accessible database of oil spill-related research projects and monitoring activities