Study finds winds played important role in keeping oil away from S. Fla.

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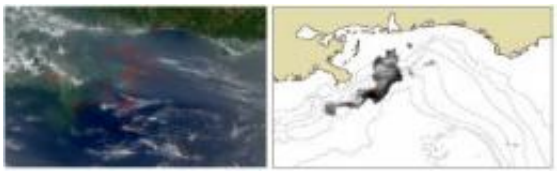

In a new study published in the journal Environmental Science & Technology, a team from the University of Miami, Colorado School of Mines and Naval Research Laboratory used numerical simulations to explain the crucial role of the wind-induced surface drift on the fate of the oil in the Gulf of Mexico. This drift was found to have a strong influence on the displacement of oil, accounting for the influence of winds on the top surface of ocean waters through the generation of waves and additional circulation. These particular wind effects are generally not represented in ocean circulation models and were missing from real time ocean circulation predictions during the Deepwater Horizon oil spill. This figure shows a comparison between the satellite-observed (left) and the modeled (right) oil slick extent on June 7, 2010. Credit: NASA-MODIS (Left)/ Univ. of South Florida (right)

The Deepwater Horizon oil spill in spring 2010 is the largest oil spill in the history of the United States, with more than 200 million gallons of crude oil released at about 1,500 m. depth off the Mississippi Delta in the Gulf of Mexico. At the time of the accident, the proximity of the intense Loop Current, flowing from the Yucatan Channel to the Florida Straits, raised major concerns that the oil at the surface of the ocean would be headed toward the South Florida and East Atlantic coastal

areas. However, the dominant transport of oil and oil products was toward the Northern Gulf coastline, and no oil was observed to reach the Atlantic Ocean.

In a new study published in the journal Environmental Science & *Technology*, University of Miami (UM) scientists Matthieu Le Hénaff, Villy Kourafalou, Claire Paris, Judith Helgers, and Ashwanth Srinivasan, in collaboration with Zachary Aman from the Colorado School of Mines, and Patrick Hogan from the Naval Research Laboratory, use numerical simulations performed at the High Performance Computing core of UM's Center for Computational Science (CCS) to explain an important aspect of the observed oil transport.

The group has demonstrated the crucial role of the wind-induced surface drift on the fate of the oil in the Gulf of Mexico. This drift was found to have a strong influence on the displacement of oil, accounting for the influence of winds on the top surface of ocean waters through the generation of waves and additional circulation. These particular wind effects are generally not represented in ocean circulation models and were missing from real time ocean circulation predictions during the Deepwater Horizon oil spill.

Incorporating this wind effect to the ocean currents, the UM scientists performed a novel 3D modeling study of the oil's spread from the bottom of the Gulf of Mexico to the ocean's surface, which allowed a realistic representation of the evolution of the 2010 oil spill. The oil spill simulations were verified through observational composites from UM's Center for Southeastern Tropical Advanced Remote Sensing (CSTARS) and from Roffer's Ocean Fishing Forecasting System, and benefited from regional circulation models that assimilate real ocean data; no change in the oil spill extent took place to match observations. Results from this study showed that the model simulation including the wind-induced drift led to substantially improved results over an identical

simulation that excluded wind drift effects.

"It is striking to notice how a large part of the surface oil erroneously made it to the Atlantic coast of Florida in the simulations that ignored the wind-induced drift. The simulation taking the drift into account correctly calculated the final destination of the oil along the Northern Gulf coastline, in remarkable agreement with observations," says Le Hénaff, a research scientist at the UM Rosenstiel School, who is also affiliated with NOAA's Cooperative Institute for Marine and Atmospheric Studies (CIMAS). "The dominant northward winds during spring and summer of 2010 led the surface oil to be pushed onto the Northern Gulf shelf areas and toward the coasts, away from the interior of the Gulf and the Loop Current southward transport. This effect, together with the evolution of the Loop Current, was crucial in maintaining the oil from the Deepwater Horizon rig within the Gulf of Mexico and away from the South Florida coral reefs and beaches."

More information: Le Hénaff, M., V. H. Kourafalou, C. B. Paris, J. Helgers, Z. M. Aman, P. J. Hogan, and A. Srinivasan (2012). Surface evolution of the Deepwater Horizon oil spill patch: combined effects of circulation and wind-induced drift, *Environmental Science & Technology*, doi:10.1021/es301570w

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