

Where did the Deepwater Horizon oil go? To Davy Jones' Locker at the bottom of the sea

October 27 2014



Controlled burning of surface oil slicks during the Deepwater Horizon event.
Credit: David Valentine

Where's the remaining oil from the 2010 Deepwater Horizon disaster in the Gulf of Mexico? The location of 2 million barrels of oil thought to be trapped in the deep ocean has remained a mystery. Until now.

Scientist David Valentine of the University of California, Santa Barbara

(UCSB) and colleagues from the Woods Hole Oceanographic Institution (WHOI) and the University of California, Irvine, have discovered the path the oil followed to its resting place on the Gulf of Mexico sea floor.

The findings appear today in the journal *Proceedings of the National Academy of Sciences*.

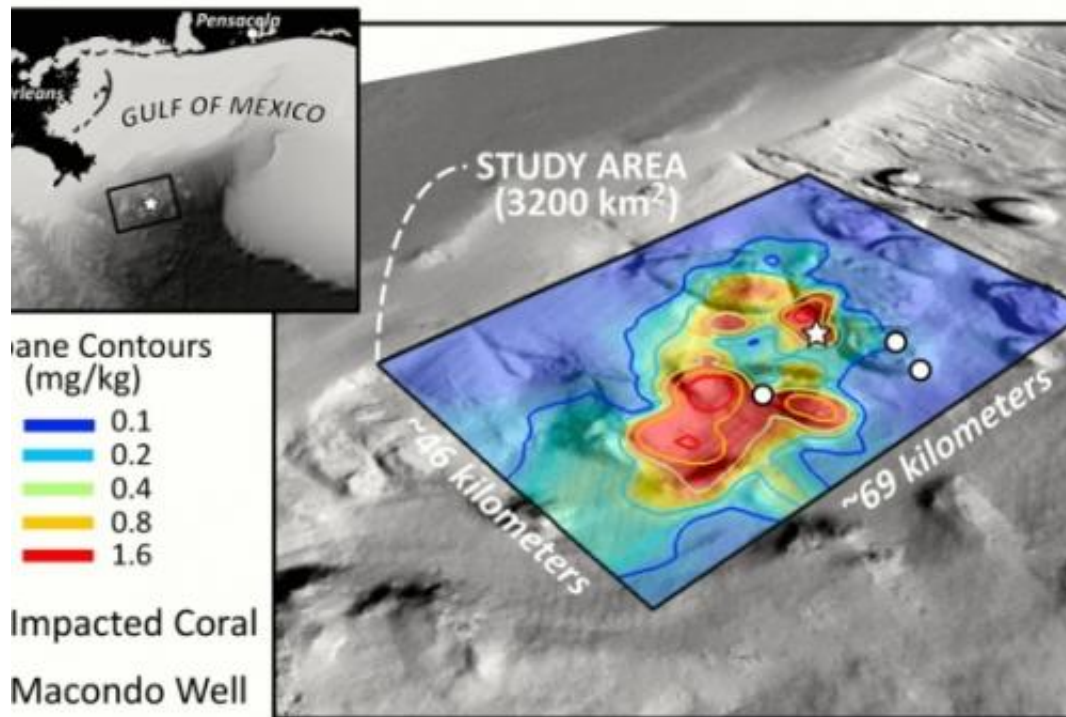
"This analysis provides us with, for the first time, some closure on the question, 'Where did the oil go and how did it get there?'" said Don Rice, program director in the National Science Foundation's (NSF) Division of Ocean Sciences, which funded the research along with NSF's Division of Earth Sciences.

"It also alerts us that this knowledge remains largely provisional until we can fully account for the remaining 70 percent."

For the study, the scientists used data from the Natural Resource Damage Assessment conducted by the National Oceanic and Atmospheric Administration.

The U.S. government estimates the Macondo Well's total discharge—from April until the well was capped in July—at 5 million barrels.

By analyzing data from more than 3,000 samples collected at 534 locations over 12 expeditions, the researchers identified a 1,250-square-mile patch of the sea floor on which four to 31 percent of the oil trapped in the deep ocean was deposited. That's the equivalent of 2 to 16 percent of the total oil discharged during the accident.



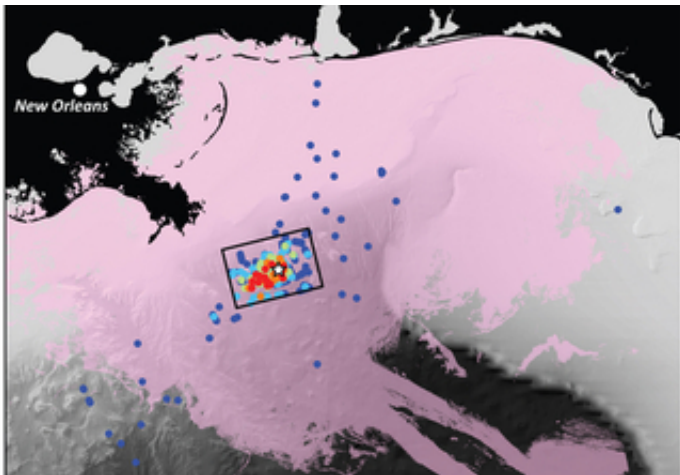
Hydrocarbon contamination from Deepwater Horizon overlaid on sea floor bathymetry, highlighting the 1,250 square mile area identified in the study. Credit: G. Burch Fisher

The fallout of oil created thin deposits that are most extensive to the southwest of the Macondo Well. The oil is concentrated in the top half-inch of the sea floor and is patchily distributed.

The investigation focused primarily on hopane, a nonreactive hydrocarbon that served as a proxy for the discharged oil.

The researchers analyzed the distribution of hopane in the northern Gulf of Mexico and found that it was concentrated in a thin layer at the sea floor within 25 miles of the ruptured well, clearly implicating Deepwater Horizon as the source.

"Based on the evidence, our findings suggest that these deposits are from Macondo oil that was first suspended in the deep ocean, then settled to the sea floor without ever reaching the ocean surface," said Valentine, a biogeochemist at UCSB.



Map of the Northern Gulf of Mexico with sampling sites in the study. Hotter colors equal more oil. Credit: David Valentine et al.

"The pattern is like a shadow of the tiny oil droplets that were initially trapped at ocean depths around 3,500 feet and pushed around by the deep currents.

"Some combination of chemistry, biology and physics ultimately caused those droplets to rain down another 1,000 feet to rest on the sea floor."

Valentine and colleagues were able to identify hotspots of oil fallout in close proximity to damaged deep-sea corals.

According to the researchers, the data support the previously disputed finding that these corals were damaged by the Deepwater Horizon spill.

"The evidence is becoming clear that oily particles were raining down around these deep sea corals, which provides a compelling explanation for the injury they suffered," said Valentine.

"The pattern of contamination we observe is fully consistent with the Deepwater Horizon event but not with natural seeps—the suggested alternative."

While the study examined a specified area, the scientists argue that that the observed oil represents a minimum value. They believe that oil deposition likely occurred outside the study area but so far has largely evaded detection because of its patchiness.

"These findings," said Valentine, "should be useful for assessing the damage caused by the Deepwater Horizon spill, as well as planning future studies to further define the extent and nature of the contamination.

"Our work can also help assess the fate of reactive hydrocarbons, test models of oil's behavior in the ocean, and plan for future spills."

More information: "Fallout plume of submerged oil from Deepwater Horizon," by David L. Valentine et al. *PNAS*, www.pnas.org/cgi/doi/10.1073/pnas.1414873111

Provided by National Science Foundation

Citation: Where did the Deepwater Horizon oil go? To Davy Jones' Locker at the bottom of the sea (2014, October 27) retrieved 29 April 2024 from <https://phys.org/news/2014-10-million-barrels-oil-ocean-floor.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.