Potential Impacts of a Hurricane on Oil from Deepwater Horizon

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June 30, 2010
1) Likely Consequences

High winds should help mix/disperse oil in the water column
help with dilution and degradation
2) Likely Consequences

High winds & currents move water/oil on shore or off shore depending on relative location of storm.

Push water on shore to right of storm - pull water off shore to left of storm.
Four Recent Significant Hurricanes

- Katrina 2005
- Rita 2005
- Gustav 2008
- Ike 2008
Inundation Region Northern Gulf of Mexico
Areas Inundated Northern Gulf of Mexico
Hurricane Katrina 2005
Areas Inundated Northern Gulf of Mexico
Hurricane Rita 2005
Areas Inundated Northern Gulf of Mexico
Hurricane Gustav 2008
Areas Inundated Northern Gulf of Mexico
Hurricane Ike 2008
3) Likely Consequences

High winds & currents move water/oil over large *along shore* distances - net counter clockwise direction in the Gulf

Expose coastline areas along the east side of the Mississippi delta and in the western Gulf.
This composite shows little change from yesterday’s analysis with almost full radar coverage of the oil spill, except for a small region just south of the Florida panhandle. Smaller slicks were observed in Barataria Bay, LA, and also Terrebonne Bay, LA.
Example of Distance Traveled During Hurricane Ike 2008

NOTICE/DISCLAIMER

This animation depicts wind velocity, water levels, inundation and passive particle movement obtained from a simulation of Hurricane IKE in 2008 computed using the ADCIRC coastal circulation model coupled to the unstructured SWAN wave model.

The initial particle distribution does not reflect actual oil location, but rather provides a general representation of potential movement in the near shore to mid-shelf region.

Particles in the animation move with the depth-averaged water velocity and most accurately represent water movement in shallow estuarine, near shore and continental shelf waters that are strongly mixed during the storm. Particle motion beyond the continental shelf is not reliable.

During the simulation, particles do not disburse, stick or degrade in any way. They may not accurately represent the movement of oil.

These results should not be used to forecast the movement of material at the sea surface or in the water column during any future event.

ACKNOWLEDGEMENT

This animation was a joint effort of the following groups:

- Univ. North Carolina at Chapel Hill, Institute of Marine Sciences
- Univ. Notre Dame, Computational Hydraulics Laboratory
- Univ. Texas, Computational Hydraulics Group, ICES
- Univ. Texas, Center for Space Research
- Univ. Texas, Texas Advanced Computing Center
- Seahorse Coastal Consulting

Funding for this work was provided by:

- National Science Foundation TeraGrid
- National Science Foundation RAPID Grant - Office of Cyber Infrastructure
- Dept. Homeland Security Science & Technology Directorate through the Center of Excellence for Natural Disasters, Coastal Infrastructure and Emergency Management (DIEM)

The content does not necessarily represent the views of these agencies.
Example of Distance Traveled During Hurricane Katrina 2005

NOTICE/DISCLAIMER

This animation depicts wind velocity, water levels, inundation and passive particle movement obtained from a simulation of Hurricane Katrina in 2005 computed using the ADCIRC coastal circulation model coupled to the unstructured SWAN wave model.

The initial particle distribution does not reflect actual oil location, but rather provides a general representation of potential movement in the near shore to mid-shelf region.

Particles in the animation move with the depth-averaged water velocity and most accurately represent water movement in shallow estuarine, near shore and continental shelf waters that are strongly mixed during the storm. Particle motion beyond the continental shelf is not reliable.

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Summary

1.) High winds should help mix/disperse oil in the water column

2.) Counter clockwise winds push water/oil onshore to the right of the storm and pull it offshore to the left

3.) Counter clockwise winds push water/oil counter clockwise around Gulf for significant distances.