# SURFACE TRAJECTORIES OF OIL TRANSPORT ALONG THE NORTHERN COASTLINE OF THE GULF OF MEXICO

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After the destruction of the Deepwater Horizon drilling platform during the spring of 2010, the northern Gulf of Mexico was threatened by an oil spill from the Macondo well. Emergency responders were concerned about oil transport in the nearshore, where it threatened immediately the fishing waters and coastline from Louisiana to Florida. In this region, oil movement was influenced by a continental shelf with varying width, the protruding Mississippi River delta, the marshes and bayou of southern Louisiana, and the shallow sounds and barrier islands that protect the coastline. Transport forecasts require physics-based computational models and high-resolution meshes that represent the waves, tides and circulation in deep water, on the continental shelf, and within the complex nearshore environment.

This work applies the coupled SWAN+ADCIRC model to simulate the transport of oil spreading across the surface of the Gulf. The simulations account for wind-driven waves and depth-averaged circulation, tides and riverine forcing, and a Lagrangian particle transport model is employed to simulate the surface trajectories of the oil. The transport model accounts for dispersion and advection by wind and currents. Transport is validated against available sequences of satellite images, and the system is shown to provide a faithful representation of the oil spill's movement. In addition, hypothetical oil transport is considered during two hurricane scenarios. Depending on the hurricane's track, oil would have moved farther into the marshes of southern Louisiana or moved along the shelf toward Texas.