New method successfully predicted how oil from Deepwater Horizon spill would spread

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Prompted by the *Deepwater Horizon* oil spill, a UC Santa Barbara scientist has come up with a new way of predicting how contaminants like oil will spread. He was able to forecast several days in advance that oil from that spill would wash ashore in particular parts of the Gulf of Mexico.

"We predicted where the oil was going to go," says Igor Mezic, a professor of mechanical engineering at UC Santa Barbara who studies fluid dynamics. "We were able to do 3-day predictions pretty accurately."

In a paper published online Sept. 2 in Science Express, Mezic, together with Sophie Loire, a postdoctoral fellow who works with Mezic, and colleagues at the software development company Aimdyn, Inc. in Santa Barbara and at NASA's Stennis Space Center in Mississippi, describe how they predicted the movement of oil spilled into the Gulf of Mexico after an explosion aboard the *Deepwater Horizon* rig on April 20.

In the following weeks, Mezic and his colleagues generated frequent forecasts of the movement of the spill and passed them on to those involved in the cleanup.

"We were on the phone with people, several days in advance, telling them where the oil was going to go," says Mezic, who began the work after watching coverage of the oil spill. "I looked at this problem on the TV and thought I could do something about it," he says. "I felt there

could be a better set of theories to predict how oil will move."

Mezic and his colleagues successfully predicted where and when oil washed ashore in the Mississippi River Delta and later, on the white-sand beaches of Pensacola, Florida, and they forecast that the spill would then move east toward Panama City Beach. Their predictions were accurate to within a couple of miles of the actual extent of the spill later assessed by NOAA from aerial surveys.

It's not easy to predict how an oil slick will spread across the ocean, Mezic says, because of the large scale involved, and the constantly changing movement of water at the sea surface, driven largely by wind.

Mezic's new approach to the problem is based on computations that describe how slicks of oil tend to be stretched into filaments by motion at the sea surface. To produce predictions of oil movement after the *Deepwater Horizon* accident, the researchers incorporated forecasts of sea surface conditions from a U.S. Navy model.

Mezic says further refinements of this new methodology could be done in order to predict the spread of many other contaminants such as ash spewed out of an erupting volcano or warm air seeping into a climate-controlled building.

"It's pretty universal," Mezic says. "It could be applied to many different kinds of situations where a contaminant or heat is moved around by a liquid or gas."

Provided by University of California - Santa Barbara

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