

University of Kadiz, Spain

Erasmus Mundus Joint Master in Water Coastal Management

Integrated concepts for water and coastal management

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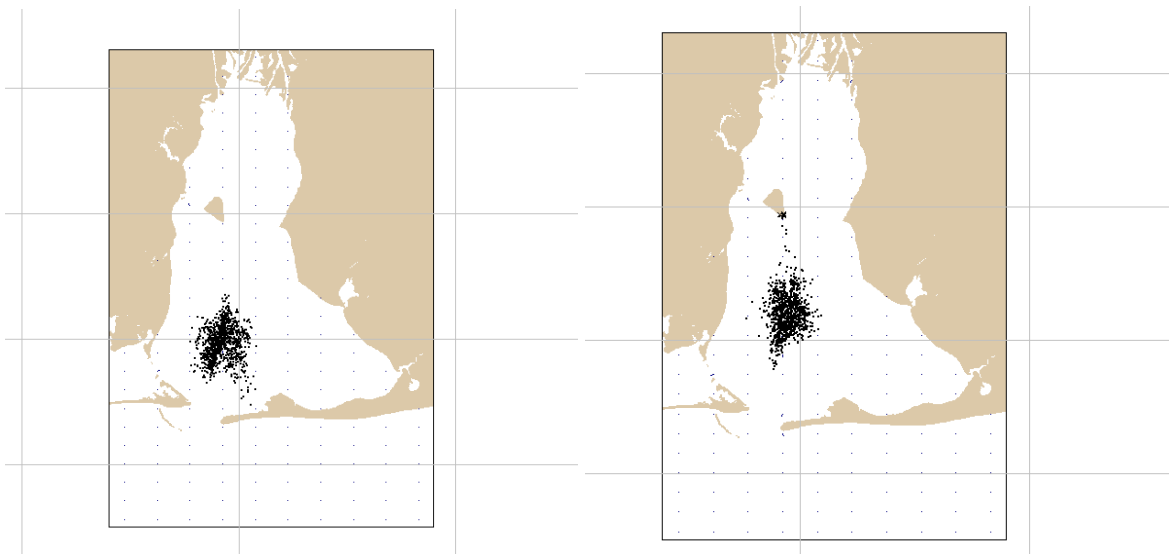
Sobir Kodirov

Trajectory of the oil spill in the Gulf of Mexico

(An explanation in five exercises)

Exercise 1.

The importance of sea tides on circulation of oil spill in the Mobile Bay.



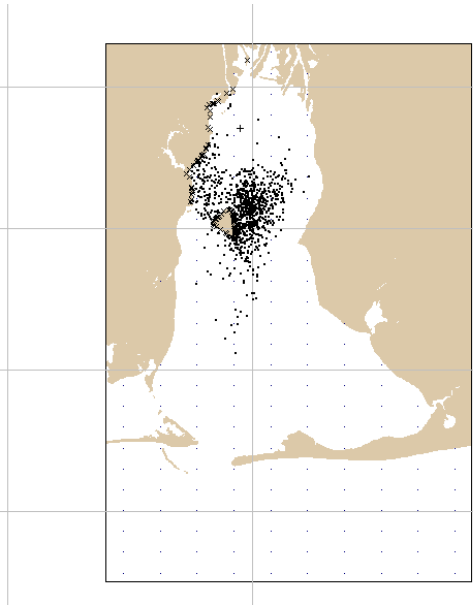
pic.1. Spill location with low tide

pic. 2. Spill location with high tide

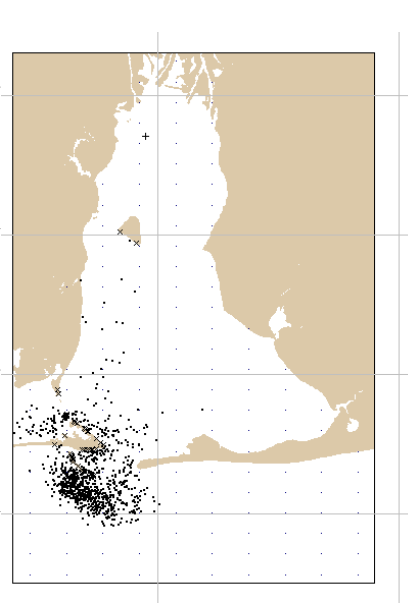
What we can understand from these pictures above, is that with the high tide oil spill is more movable and thus its reaches an island. Moreover, the spill is more spreaded out in this case.

Exercise 2.

The location of oil spill points near to Mobile river estuary at different discharges (minimal 30 kcfs and maximal 200 kcfs).



pic.3. Spill point with minimal river discharge

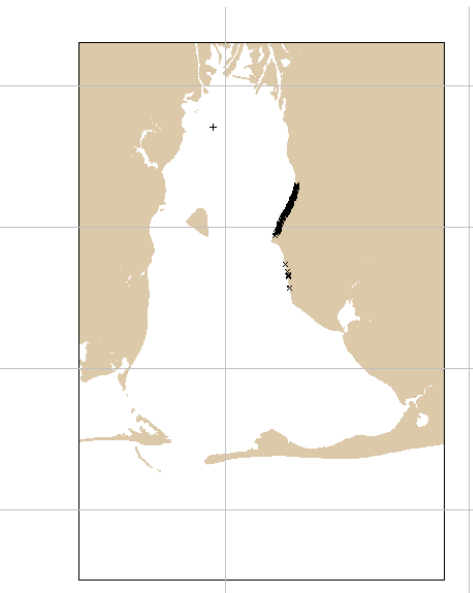


pic. 4. Spill point with maximal river discharge

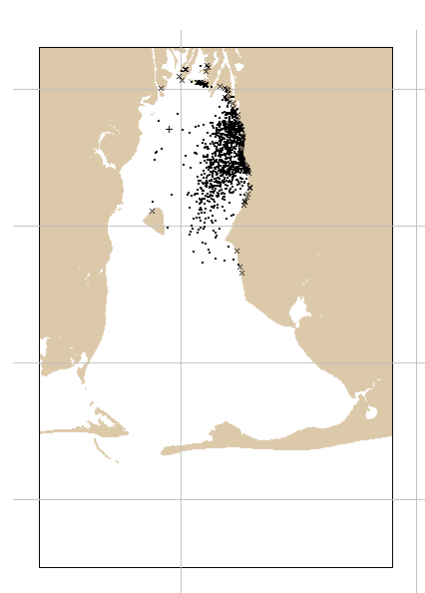
As the pictures above depicts with the maximal discharge there is substantial change in location of oil spill. It seems some part of oil spill moves to open water and considerable part of spill in the south of the Bay. With the low discharge on the other hand, spill is almost surrounds an island.

Exercise 3.

In peivious two exercises we were considering wind as a constant. In this time wind moves and changes in speed and direction. Its pushes the oil slick over the water surface and futhermore creates sea currents.



pic. 5. Spill point with constant and homogeneous wind flowing

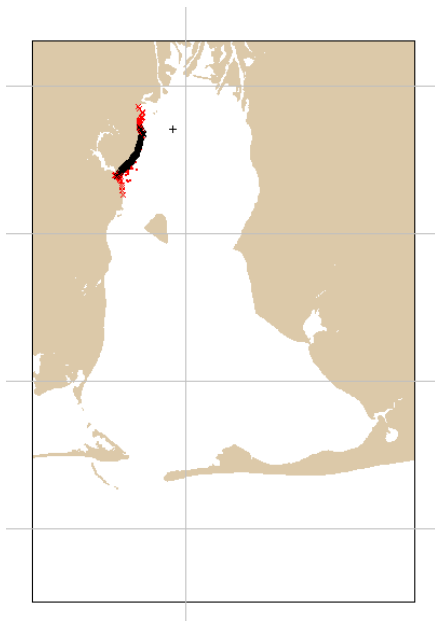


pic. 6. Spill point with variable wind conditions

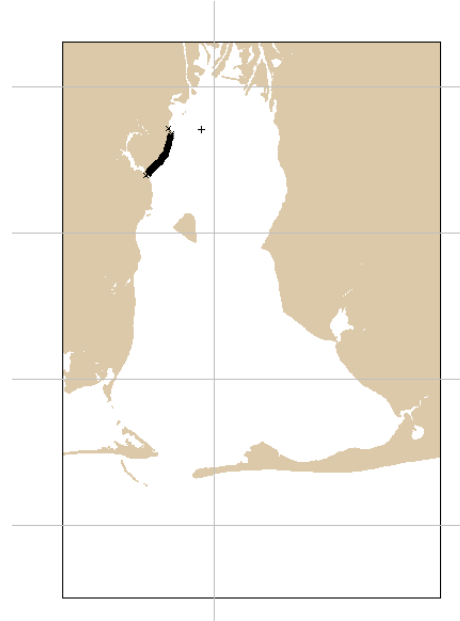
There are significant changes with variable wind conditions. It is clear that in the picture five, with constant and homogeneous wind flowing conditions, oil spill gathered along the shoreline. Spill point with variable wind conditions (pic. 6) the spill spreaded out to long distances. Even part of river delta covered with oil spill.

Exercies 4.

All predictions are not perfect. In current exercise GNOME proposes the solution “**Minimum Regret**” and this solution takes into account the uncertainty in wind field forecast, horizontal mixing and current velocity wind.



pic. 7. Spill point with including “Minimum Regret”



pic. 8. Spill point without “Minimum Regret”

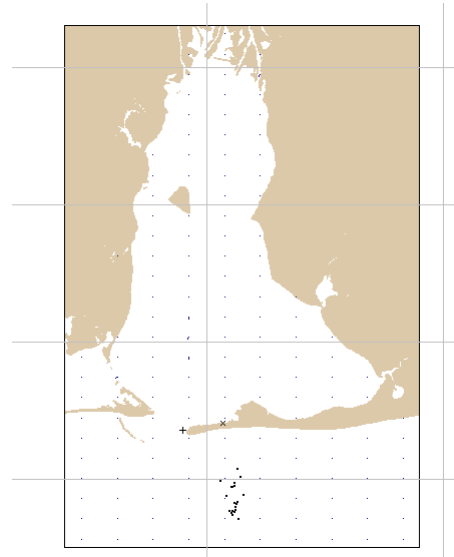
So, the pictures above give information about how oil spill behaves with or without considering the soluuiou “Minimum Regret”. It’s obvious that with the solution we get additional information and possible view of accident.

Exercise 5.

In this exercise different kinds of pollutants present a different weathering. In previous exercises we have been applying the same sort of pollutants however this time we are going to use different types of pollutants (mean crude and gasoline).



pic. 9. Spill point of Mean crude



pic. 10. Spill point of Gasoline

Analyzing pictures 9 and 10 we can understand that, when an oil spill occurs, it takes a long time to be digested or disappear. On the other hand, when gasoline leakage happens it disappears relatively quickly. However, it does not mean that gasoline leakage has less impact on the environment. In the first case, the spill remains mainly in water; in the second case, the spill stays in the atmosphere.

Main conclusion or view on the worst scenario

In my opinion, the case we have seen in exercise three might be the worst scenario. Due to variable wind conditions, oil spills can reach the coastline for long distances, which means the whole coastal area, infrastructure, and environment are harmfully impacted by the oil spill. In many cases, coastal areas are highly populated and, moreover, nuclear and other kinds of power plants are located mostly in these places. And this makes the situation even more anxious.