



## DHI CASE STORY

# HOW OCEANOGRAPHIC FORECASTS IMPROVE OIL SPILL MODELLING AROUND TRINIDAD AND TOBAGO

Predicting strong currents accurately is vital for a trustworthy oil spill forecast system

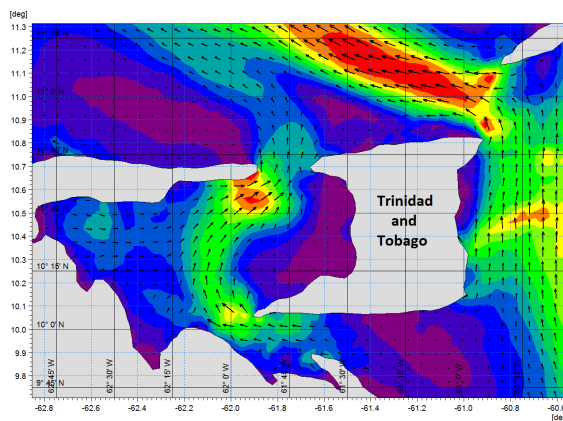
An oil spill will cause havoc leaving widespread ecological and wildlife devastation in its wake. Thus, it has become crucial to model probable oil spills and their impacts. This is required to mitigate the destructive consequences of such spills, as much as possible. Our client – Coastal Dynamics Limited (CDL) conducts numerous oil spill trajectory studies for their own clients. However, they wanted to improve their services, with respect to better current information in the region. As such, the need arose for more advanced 3D hydrodynamic modelling. We provided the necessary software and knowhow for such in-depth oceanographic forecasting and 3D modelling setups, enabling our client to significantly improve their own services. Based on our expertise, their new forecast system is set to commence operations in 2013.

## OIL SPILL MODELLING – VITAL IN TODAY'S WORLD

Oil spills are notorious for causing widespread ecological damage in different regions across the globe. The quantity of oil spilled during accidents can range from a few hundred tonnes to several hundred thousand tonnes. The resultant destruction to flora and fauna is always devastating.

A few examples of major oil spills include the Deepwater Horizon oil spill in the Gulf of Mexico and the Atlantic Empress oil spill near Trinidad, Tobago and Barbados. The former – the largest accidental oil spill in the history of the petroleum industry, estimated to around 661,000 tonnes of oil being spilled with huge impacts along the US shores of the Gulf of Mexico. The latter resulted in 287,000 tonnes of oil spilled – which never came ashore.

Thus, it is evident that oil spill modelling has become imperative, given the intense and far-reaching impacts that such spills have on ecology and wildlife.



Currents around Trinidad and Tobago on 14 April 2012  
00Z

## SUMMARY

### CLIENT

Coastal Dynamics Limited (CDL)

### CHALLENGE

- Accurately forecasting oceanographic currents, tidal currents and wind driven currents around Trinidad and Tobago
- Providing CDL clients with timely and trustworthy oil spill forecasts

### SOLUTION

- A calibrated oceanographic model for the Trinidad and Tobago area
- The software required to run daily forecasts of currents and water levels using the calibrated model
- An oil spill modelling software to run oil spill forecasts and oil spill scenarios
- The set-up of an operational current and oil spill forecast system at CDL premises, so CDL can provide its clients with oil spill forecasts

### VALUE

CDL can provide their clients with improved and more accurate oceanographic current forecasts and oil spill scenario modelling as well as oil spill forecasts

### LOCATION / COUNTRY

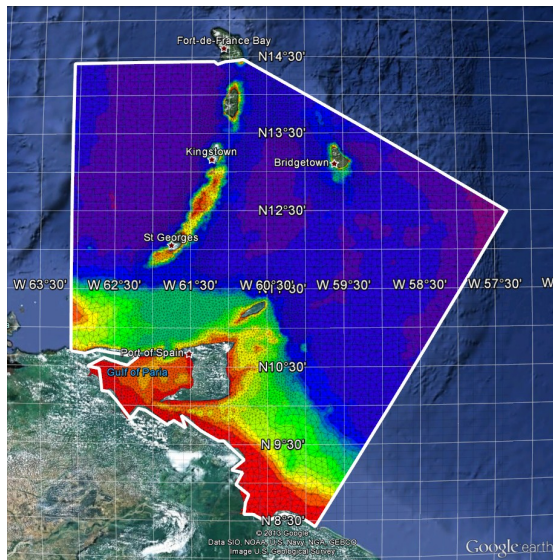
Trinidad and Tobago

### ACCURATE CURRENTS IMPERATIVE FOR OIL SPILL MODELLING AROUND TRINIDAD AND TOBAGO

The area around Trinidad and Tobago is characterised by strong ocean currents. Unfortunately, there is often a paucity of information regarding these strong surface currents, which have made accurate oil spill modelling difficult.

These strong currents are primarily derived from the strong ocean flows originating from the Guyana Current. This current sweeps past Trinidad and Tobago on its way to the Caribbean Sea. The strength of the ocean flows is further increased by the North Brazil Retroflexion ring currents that migrate towards the Caribbean Sea. These combined currents are typically in excess of 3.5 knots near the sea surface and have the potential to adversely affect marine offshore operators significantly.

The strong currents are a very important factor in the evaluation of the environmental risk posed by pollutants such as spilled hydrocarbons. To predict such strong currents, adequate information and a capable and detailed oceanographic model is necessary.



Area covered by MIKE 3 FM forecast model

### WE HELP CDL TO MOVE FORWARD WITH THEIR IMPROVED FORECAST SYSTEM

In order to improve their services, CDL decided that a more efficient 3D hydrodynamic model was needed – to meet the demand for quality hydrodynamic (current) forecast data for the region.

We provided not only the software, but also our expertise to help CDL in developing the oceanographic forecast model.

### CLIENT TESTIMONIAL

“ CDL has had a long history of working with DHI in meeting our needs for numerical modelling for various aspects of environmental and engineering studies. As such, when the need arose to improve on the hydrodynamic data to be used as part of our environmental work we sought the advice of DHI in developing a robust and accurate flow model for the region.”  
 Nazeer Gopaul —Director —Coastal Dynamics Limited

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 For more information visit: [www.dhigroup.com](http://www.dhigroup.com)

Our services in the set-up phase included:

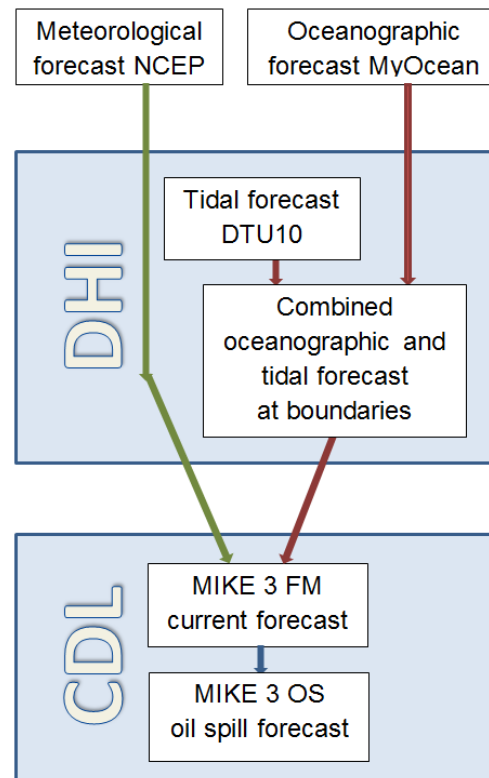
- a calibrated current model of the area around Trinidad and Tobago (Eastern Caribbean) using MIKE 3 FM (see illustration)
- the software required to run daily forecasts of currents and water levels using the calibrated MIKE 3 model
- the oil spill modelling software required to run oil spill forecasts and oil spill scenarios

During the daily forecast operations (see illustration) our services include:

- Meteorological forcing
- MIKE 3 FM boundary data with combined tidal and oceanographic forcing

With the above input provided twice daily CDL produces two daily current forecasts covering the period up to 5 days ahead in time.

CDL were already using DHI's oil spill model, and with the new improved current forecast system they are ready to serve their clients.



Forecast data flow (twice daily)