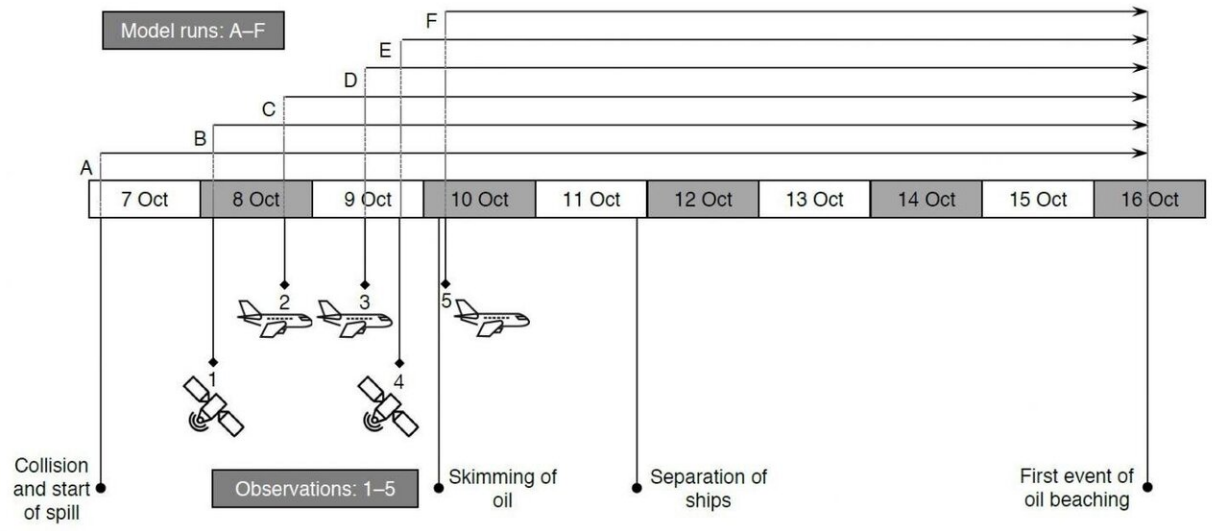
Oil spill: Where and when will it reach the beach? Answers to prevent environmental impacts

April 6 2020



Timeline of the accident, some operations at sea, oil spill observations (1-5), and model runs (A-F) Credit: ©Svitlana Liubartseva, CMCC Foundation

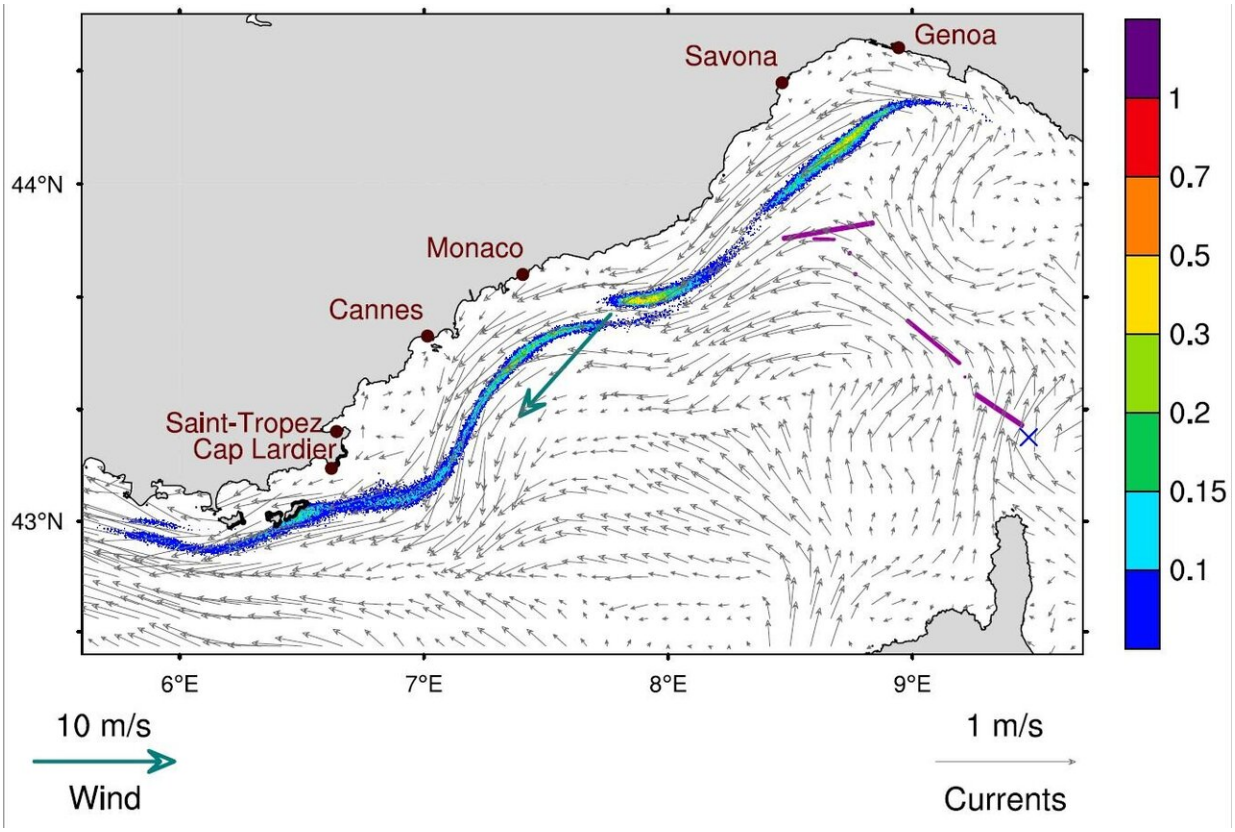
In October 2018, the Tunisian Ro-Ro passenger ship "Ulysse" rammed into the hull of the Cyprus-flagged container ship "Virginia," which was anchored in international waters off the northern tip of Corsica, an area known for its pristine waters and beaches. Bunker fuel from Virginia leaked out of her tanks through a breach several meters long, threatening the marine environment and coastal areas. 530 m^3 of oil were released,

and in 36 hours the slick had lengthened to cover approximately 35 km.

Predicting the drift of oil slicks on water surfaces and in coastal zones is fundamental for responding to spill events and to mitigate their impacts on the environment, allowing for a more efficient use of emergency response resources.

A recently published scientific paper tells about the collaboration that was formed for this purpose, between the researchers of the CMCC Foundation—Euro-Mediterranean Center on Climate Change and REMPEC, the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea, based in Malta, right after the collision of Ulysse with Virginia.

"Thanks to a joint effort involving efficient and timely exchange of information, we received observational data from REMPEC and used these real observations as the starting point for our model in order to calculate the forecast," explains Svitlana Liubartseva, researcher at the CMCC Foundation and first author of the study. "We worked day and night, and provided REMPEC with 5 forecast bulletins during the oil spill tracking and recovery operations."



Pink polygons indicate the area where the model was restarted from on 10 Oct. 2018. A blue cross marks the ships' point collision. Credit: ©Svitlana Liubartseva, CMCC Foundation

Forecast of currents, wind, waves and sea surface temperatures are critical for predicting the spread and fate of oil. The study is focused on the ability to realistically predict the times and places where oil reaches coastlines thanks to the oceanographic model MEDSLIK-II, developed by CMCC Foundation. The model results were verified by comparing available observational data.

"Using the oceanographic and atmospheric dataset provided by the Copernicus Marine Environment Monitoring Service (CMEMS) and the European Centre for Medium-Range Weather Forecasts (ECMWF) we

produced forecasts of the oil drift. The CMEMS output has a high resolution of about 4 km, that allowed us to produce a rather good quality of prediction of when and where the oil reached the beaches," specifies Dr. Liubartseva.

For the first 16 days after the accident, the model was able to generate reliable predictions, forecasting the oil movements at least 7 days in advance. Researchers were able to predict almost precisely the place and time where the oil would reach the coast for the first time. After more than 9 days drifting at sea, it landed near Saint-Tropez (France). Due to a lack of observational data in the long run there was a deterioration in the model solution, as the oil drifted for about one month. Nevertheless, the research demonstrates that the CMCC model facilitates the use and optimization of anti-pollution resource deployment and increases coastal preparedness.

CMCC researchers are now at work to further improve the predictability of oil spill drift and transformation. On the one hand, there is the need to improve the resolution of the models, making their grid finer and finer, which will involve studying more oil spill events to get better predictions.

More information: S. Liubartseva et al, Model-based reconstruction of the Ulysse-Virginia oil spill, October–November 2018, *Marine Pollution Bulletin* (2020). DOI: 10.1016/j.marpolbul.2020.111002

Provided by CMCC Foundation - Euro-Mediterranean Center on Climate Change

environmental-impacts.html