OIL SPILL RISK ASSESSMENT ON THE MALTESE COASTAL AREAS

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Abstract
A significant percentage of the global oil transport goes through the Mediterranean sea. Most of the maritime traffic carrying oil and other dangerous liquid substances travels across the Malta Channel. The risk of marine spillages within the stretch of sea between Malta and Sicily is very high and beaching on the Maltese shores can cause irreversible environmental damage at the detriment of important economic resources. The aim of this work is to determine the probability and volume percentage of oil that would reach the coast in case of an accident in the proximity of the Maltese Islands. Various spill scenarios are considered to get a realistic estimate as much as possible.

Keywords: Models, Malta Channel, Circulation models

In this work the MEDSLIK Oil Spill Model is used to perform an assessment on the vulnerability of the Maltese coast to potential impacts of marine oil spillages. Although similar risk analysis have been performed in other regions, quantitative assessments are still lacking for the Maltese Islands. Moreover, such studies necessarily rely on the availability of data that can well represent meteo-marine conditions in the area. In this study, data derived from marine and atmospheric models run by the Physical Oceanography Unit of the University of Malta over a period of one whole year was used. A regular grid of points representing spill origins around the Maltese Islands was considered (Figure 1). Simulations each of 120 hours duration (5 days) were run for every point for every day for the year 2011 (365 days), and 500 tons of light oil was assumed to instantaneously leak at midnight for each simulation. The oil spill vulnerability index was set on the basis of the spill origin, the location of beaching, and the time taken for the oil to reach the coast.

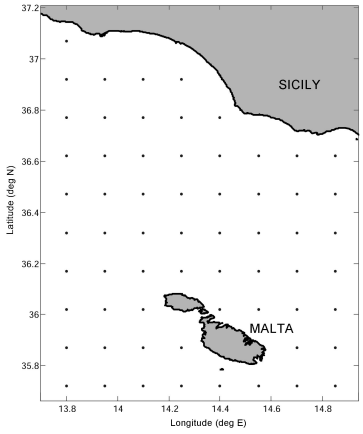

Fig. 1. Points on a regular grid considered for oil spill origin in the simulations.

For each oil spill simulation, the percentage of oil reaching the coast was determined. In order to have a clearer indication of the damage and the effected resources, the coastline regions corresponding to major bays, ports, reverse osmosis and fish farms were initially identified and treated separately. Such areas cover most of the important Northern and Southern regions of the main island (Malta), the smaller island Gozo as well as Comino (Figure 2). The MEDSLIK input files consist of averaged fields updated every 6 hours and describing the marine conditions produced by the ROSARIO96 forecasting system. These fields extend over the Malta Shelf Area, with a spatial resolution of 1/96°, and prepared operationally through the daily re-initialization from the Sicily Channel Regional Model (SCRM) that produces daily averaged forecasts with a resolution of 1/32° [1]. Surface forcing is derived from the hourly high resolution forecast fields by the SKIRON atmospheric model which is run on a daily basis by the University of Athens [2].

Before carrying out the risk assessment analysis, the performance of the MEDSLIK oil spill model was validated. The ROSARIO96 forecast sea surface currents were compared to vectors recorded by the HF radar network that was recently installed in the region as part of the CALYPSO project [3]. The trajectory module of MEDSLIK was also used and the results were compared with the recorded and transmitted positions of six MetOcean iSVP drifters. Such equipment was deployed in the Malta Sicily in December 2012 as a joint effort between CALYPSO, the Argo-Italy programme [4] and the WP3 of the EU FP7 SIDERI project [5].

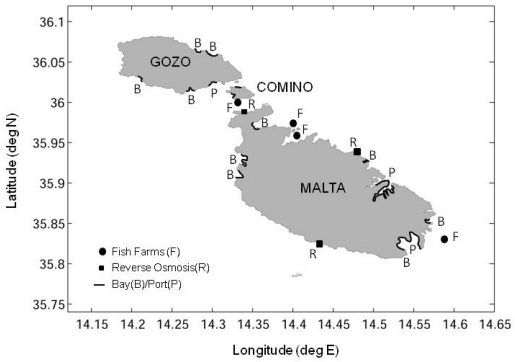

Fig. 2. Location of bays, ports, reverse osmosis and fish farms on the Maltese Islands.

A large number of runs were required and although script files were written to automate the process, the MEDSLIK model still needed a reasonable time to run simulations over the required timelines. The regions that are most prone to oil spill impacts were determined on the basis of the percentage of beached oil. The coastal sea area around the Maltese Islands was divided into regions and the typical timeframe for a spill within each region to reach the coast was determined.

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