

A supporting marine information system for marine oil spill emergencies in the Italian seas

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Introduction

Promptness and quality with which decisions are taken to respond to marine pollution events are fundamental in the positive or negative final outcome of the adopted measures. In this context, decision support tools, like numerical oil-spill prediction models and risk maps, may significantly improve and make more effective the decision-making process of the competent national or regional authorities. Over the years, commercial organizations or scientific institutions have developed a wide variety of supporting tools, such as WITOIL (Liubasrteva et al., 2016) or MEDESS-4MS (Zodiatis et al., 2016). Since the Intervention Convention of 1969, the United Nations Convention on the Law of the Sea (UNCLOS) imposes a general obligation on Countries to protect and preserve the marine environment, taking individually or jointly all the measures to prevent, reduce and control pollution from any source. UNCLOS also asks to take measures beyond the territorial sea proportionate to the actual or threatened damage to protect their coastline or related interests. The increasing sensibility of the Italian public opinion on marine oil pollution, led the Italian Ministry of the Environment and Protection of Land and Sea to entrust the Italian National Research Council (CNR) the development of an oil-spill forecasting system for the Italian seas. In 2016 the project SOS Piattaforme e Impatti Offshore started with the aim to implement a numerical prediction service for hydrocarbons dispersion within the Italian seas. The objective of this project is to provide to the Italian authorities a Decision Support System (DSS), giving the near-real-time spatial and temporal evolution of oil spills in case of emergency situations or planned exercises, allowing the optimization of the resources and emergency management.

DSS: the numerical system

The main components of a DSS are a numerical system and a Graphical User Interface (GUI). The prediction of the oil slick movement due to the currents and wind is carried out by a computational processing of the sea forecast conditions. Our numerical system includes the forecast of the marine circulation at different space scales (Sorgente et al., 2011) and the transport and transformation of the spill of hydrocarbon through the MEDSLIK-II model, a Lagrangian community numerical model (De Dominicis et al., 2013_a). It allows the estimation of the spatial and temporal evolution (within the next 96 hours) of the oil spill fate at sea, as forced by weather forecast (wind), sea conditions (temperature and currents) and chemical and physical processes affecting the spilled oil. The system also permits to

estimate hazards of oil slicks from the seven active oil platforms in the Sicily Channel and in the Adriatic Sea under different weather and sea conditions.

DSS: the Graphical User Interface

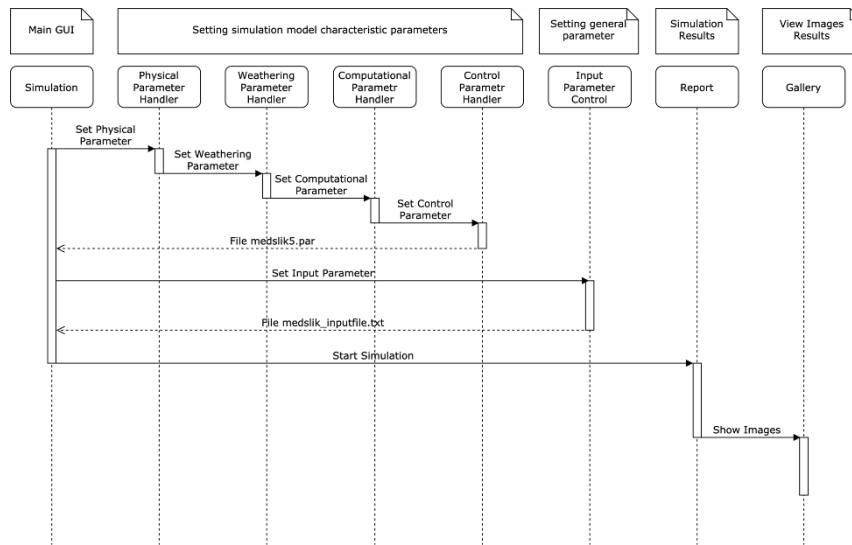


Figure 1: Simulation Flow Diagram

The DSS is managed through a GUI, where the users can set the parameters for the simulation (oil type, physics of seawater, oil weathering processes), the computation (time steps per hour and dimension of the array), the control (rate of evaporation, increase of water fraction, spreading of the slick, its dispersion), and other general parameters like date and length of simulation, spill coordinates, type, rate, and duration, all necessary to the numerical component. The choice of the domain (Western or Central Mediterranean Sea and Adriatic Sea) is made by a rule-based system, which takes into account the coordinates of the spill, the availability of the forecasting for the selected date and the length of the simulation. Once the simulation starts, the user is redirected to a grid view representing the evolution. Finally, the DSS produces a gallery of images showing the trend of the characteristic parameters of the oil during the simulated period and the oil spill's evolution frame-by-frame. The access to the DSS is from <http://www.seaforecast.cnr.it/sos-piattaforme/> but actually limited to competent national or regional authorities.

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