Development of decision support system for oil spill management in the Mediterranean Sea

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Possible oil spill accidents and operational pollution could have severe impacts on the Mediterranean basin. It is therefore crucial to provide decision makers, stakeholders, and public with trustworthy DSS (Decision Support System) based on the environmental monitoring, state-of-the-art modeling and innovative technology platforms.

Innovative web-based decision support system, called WITOL (Where Is The Oil http://www.witoil.com), has been developed to maintain emergency management in case of oil spill accidents. WITOIL embraces (1) Lagrangian oil spill model MEDSLIK-II (De Dominicis et al., 2013 http://medslikii.bo.ingv.it) coupled with the basin-scale and regional operational oceanographic services; (2) two-modular block of oil spill forecast and uncertainty evaluation; (3) user visualization tool including web and mobile interface with visualization of geospatial information by means of Google Maps.

Service-oriented approach plays a key role in the WITOIL DSS development. The system meets the real-time requirements in terms of performance and in dynamic service delivery. Client part of WITOIL is presented by a 8-language GUI (Graphical User Interface) supplied with a great variety of user services including a video tutorial (https://www.youtube.com/watch?v=qj_GokYy8MU). GUI allows users to configure and activate the system, visualize the results using Google Maps, and save them afterwards.

Not only does a new generation of DSS require the oil spill forecast, but it also needs the evaluation of uncertainty, which is critical for efficient response, recovery, and mitigation. Uncertainty in prediction of the oil transport and transformation stems from the uncertain environment and data-sparse. A new methodology of uncertainty calculation with respect to initial conditions is incorporated in WITOIL DSS. The results are presented in probability terms.

Special application to Android has been implemented to support users involved in the field operations.

The system is developed as a part of TESSA Project portfolio providing the unified access to others services. Thus, SEACONDITIONS (http://www.sea-conditions.com) performs visualization and on-line delivery of forecast of surface currents, sea surface temperature, significant wave height and direction, wave period and direction; air temperature, surface pressure, precipitation, cloud coverage, wind speed, *etc*. Apart from the basin scale visualization SEACONDITIONS supports the zooming capability.

User feedback reports from fishermen, port authorities including Coast Guard, offshore companies, aquatic and coastal tourism managers, and academia have been collected and used for the system improvements. User-friendliness of GUI, tooltips, an opportunity to vary the advanced parameters, efficiency of the visualization tool, and a help section were appreciated in these reports. In accordance with the users' requirements, a to-do list is composed for the further development of WITOIL.

References

De Dominicis, M., Pinardi, N., Zodiatis, G., and Lardner, R., 2013. MEDSLIK-II, a Lagrangian marine surface oil spill model for short term forecasting – Part 1: Theory. Geosci. Model Dev. 6, 1851–1869.