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New techniques on oil spill modelling applied in the Eastern Mediterranean sea

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Small or large oil spills resulting from accidents on oil and gas platforms or due to the maritime traffic comprise a major environmental threat for all marine and coastal systems, and they are responsible for huge economic losses concerning the human infrastructures and the tourism.
This work aims at presenting the integration of oil-spill model, bathymetric, meteorological, oceanographic, geomorphological and geological data to assess the impact of oil spills in maritime regions such as bays, as well as in the open sea, carried out in the Eastern Mediterranean Sea within the frame of NEREIDs, MEDESS-4MS and RAOP-Med EU projects. The MEDSLIK oil spill predictions are successfully combined with bathymetric analyses, the shoreline susceptibility and hazard mapping to predict the oil slick trajectories and the extend of the coastal areas affected.
Based on MEDSLIK results, oil spill spreading and dispersion scenarios are produced both for non-mitigated and mitigated oil spills. MEDSLIK model considers three response combating methods of floating oil spills: a) mechanical recovery using skimmers or similar mechanisms; b) destruction by fire, c) use of dispersants or other bio-chemical means and deployment of booms.
Shoreline susceptibility map can be compiled for the study areas based on the Environmental Susceptibility Index. The ESI classification considers a range of values between 1 and 9, with level 1 (ESI 1) representing areas of low susceptibility, impermeable to oil spilt during accidents, such as linear shorelines with rocky cliffs. In contrast, ESI 9 shores are highly vulnerable, and often coincide with natural reserves and special protected areas. Additionally, hazard maps of the maritime and coastal areas, possibly exposed to the danger on an oil spill, evaluate and categorize the hazard in levels from low to very high. This is important because a) Prior to an oil spill accident, hazard and shoreline susceptibility maps are made available to design preparedness and prevention plans in an effective way, b) After an oil spill accident, oil spill predictions can be combined with hazard maps to provide information on the oil spill dispersion and their impacts. This way, prevention plans can be directly modified at any time after the accident.