



Evaluation of oil spill hazard and risk for the shorelines of a mediterranean coastal archipelago

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A combined deterministic/probabilistic method for evaluating the hazard of oil slicks contact with the shores of the Archipelago of La Maddalena (north Sardinia, Western Mediterranean) has been developed and applied. The core of the method is a coastal 3D finite elements modeling system, able to simulate hydrodynamics and waves of the strait of Bonifacio and, by means of a lagrangian module, the physical/chemical fate of the oil. During a 2-years long experiment, the model, forced with atmospheric analyses, simulates the hydrodynamics and releases continuously oil particles along the main naval pathways of the area, accordingly to nautical traffic data, simulating their physical/chemical evolution and beaching. The oil spill module is initialized (oil quantity, type, location) on the basis of the analysis of the Vessel Traffic System (VTS) data. The Oil Spill Hazard Index (OSHI) is given by the total quantity of landed oil, for each predefined coastal cell (300 X 300 m), normalized on the released oil. An hazard index between 0 and 1, which estimates the relative probability of oil contact with the shores, has been so obtained and mapped by using GIS tools. Areas and periods subject to the largest hazard have been therefore defined: this represents an important information for the management of oil slick emergencies. Such a hazard index can be easily combined, by means of GIS tools, with quali-quantitative parameters of vulnerability in order to estimate the risk, which is given by *hazard * vulnerability*. Finally, a practical example of risk mapping and evaluation, which takes into account the beaches granulometry, is here provided.