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Analysis of the Contribution of Coastal and Marine Physical Factors to Oil Slick Movement: Case Study of Misrata, Libya

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Abstract : Developing a coastal oil spill management plan for the Misratah coast is the motivating factor for building a database for coastal and marine systems and energy resources. Wind direction and speed, currents, bathymetry, coastal topography and offshore dynamics influence oil spill deposition in coastal water. Therefore, oceanographic and climatological data can be used to understand oil slick movement and potential oil deposits on shoreline area and the behaviour of oil spill trajectories on the sea surface. The purpose of this study is to investigate the effects of the coastal and marine physical factors under strong wave conditions and various bathymetric and coastal topography gradients in the western coastal area of Libya on the movement of oil slicks. The movement of oil slicks was computed using a GNOME simulation model based on current and wind speed/direction. The results in this paper show that (1) Oil slick might reach the Misratah shoreline area in two days in the summer and winter. Seasons. (2) The North coast of Misratah is the potential oil deposit area on the Misratah coast. (3) Tarball pollution was observed along the North coast of Misratah. (4) Two scenarios for the summer and the winter season were run, along the western coast of Libya . (5) The eastern coast is at a lower potential risk due to the influence of wind and current energy in the Gulf of Sidra. (6) The Misratah coastline is more vulnerable to oil spill movement in the summer than in winter seasons. (7) Oil slick takes from 2 to 5 days to reach the saltmarsh in the eastern Misratah coast. (8) Oil slick moves 300 km in 30 days from the spill resource location near the Libyan western border to the Misratah coast.(9) Bathymetric features have a profound effect on oil spill movement. (9)Oil dispersion simulations using GNOME are carried out taking into account high-resolution wind and current data.

Keywords : oil spill movement, coastal and marine physical factors, coast area, Libyan
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