

THE SUCCESSFUL APPLICATION OF THE MEDITERRANEAN OIL SPILL MODEL IN ASSISTING EU DECISION MAKERS DURING THE OIL POLLUTION CRISIS OF LEBANON IN SUMMER 2006

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Abstract

The Mediterranean oil spill model (MEDSLIK) was applied during the Lebanese oil pollution crisis in July and August 2006 in order to assist the decision makers in Europe and the Eastern Mediterranean. MEDSLIK is coupled operationally to the high resolution flow model of the Cyprus Coastal Ocean Forecasting and Observing System (CYCOFOS), using the SKIRON winds. The MEDSLIK simulations showed that the oil moved northward from the Jieh power station along the Lebanese and Syrian coast. The displacement of the dispersed oil and the affected coastal areas were validated by local observations and satellite remote sensing images.

Keywords : Petroleum, Pollution, Models, Remote Sensing, Levantine Basin.

The risk of oil spill pollution in the Mediterranean Sea is high due to the heavy traffic of merchant vessels for oil transportation and to the many coastal installations related to the oil industry. Oil spills are a matter of concern due to the damaging effect they can have on various coastal resources. To mitigate such damage as much as possible, it is common to combat a spill by deploying equipment such as booms and skimmers or to spray chemical dispersants. In order to make optimal use of such devices it is common to employ a computer model to predict where the spill will most likely move to, in particular what resources are threatened, and how soon it will get there. Such models often predict the expected state of the oil when it arrives, that is, how much will have evaporated, the degree of emulsification of the remainder, how much will remain on the surface and how much will be dispersed as fine droplets throughout the water column. In the case of the Lebanese oil pollution crisis in mid July-August 2006, there was no possibility for the responsible agencies to act as long the war actions continued. The Jieh power station spill is considered as the biggest so far in the Eastern Mediterranean. There was an urgent request to the Cyprus Oceanography Centre to provide predictions regarding the displacement of the oil that was spilled into the sea from the oil tank installations of the Jieh power plant, from several European and regional agencies (REMPEC-Regional Emergency Centre for Response to Oil Spill Pollution in the Mediterranean, the Cyprus Ministry of Environment and the European Commission Civil Protection co-operation Mechanism through the Cyprus Civil Protection Agency). MEDSLIK [1] was designed to predict the transport, fate and weathering of an oil spill, and has been applied operationally using the high resolution forecasting products of the Cyprus Coastal Ocean Forecasting and Observing System (CYCOFOS). CYCOFOS [1] is nested within the Mediterranean Forecasting System (MFS), using the high frequency SKIRON winds. MEDSLIK constitutes one of the oil spill models of the Marine Environment and Security in the European Areas (MERSEA) project [2], that aims at establishing the Marine Core Services of the Global Monitoring for Environment and Security (GMES) of the European Union.

Results and discussion

According to the input information provided by REMPEC, the MEDSLIK oil spill model was applied using the operational CYCOFOS forecasting products, in order to predict the dispersion and the movement of the oil spill in the NE Levantine. After the bombing of few of its oil tanks, which are located right on the coast, early on the morning of the 13th and 15th July 2006, 10,000-20,000 tons of a very heavy oil (with API around 20) were spilled in the sea. The CYCOFOS forecasts showed a strong (20-30 cm/s) northward current along the Lebanese and Syrian coast. This flow pattern remained throughout the examined period, from mid-July to the end of August, 2006. The same period the SKIRON forecasts showed winds 2-7 m/s varying between Southwesterly - Southerly in the area of interest. Consequently the MEDSLIK simulations showed that the spilled oil was pushed northward by the currents and the winds (Fig.1). Significant amounts of oil were deposited on the coast adjacent to the Jieh power plant and on the coast northward between there and Beirut, especially on the headland of South Beirut. Much of this coastal oil was subsequently washed off the coast and moved northwards by the northward currents and winds. Within 3 days of the start of the incident, evaporation was complete and a little less than 20% of the original oil had evaporated. The model predicted that after 15 days almost 80% of the original oil was on the coast, while about 0.035% of the oil remained into the sea. Coastal impact remained heaviest south of Beirut. There was a significant impact

between Beirut and Chekka and northwards to the Syrian border, and on the Syrian coast from the border to Tartus with lighter impact up almost to Latakia. The results of the oil spill simulations, regarding the affected coastal areas, were validated from observations of the Lebanese Ministry of Environment and satellite remote sensing images. The results of the MEDSLIK simulations assisted the European and Mediterranean agencies to obtain a first overview of the area covered by the spilled oil during the period of the war in Lebanon.

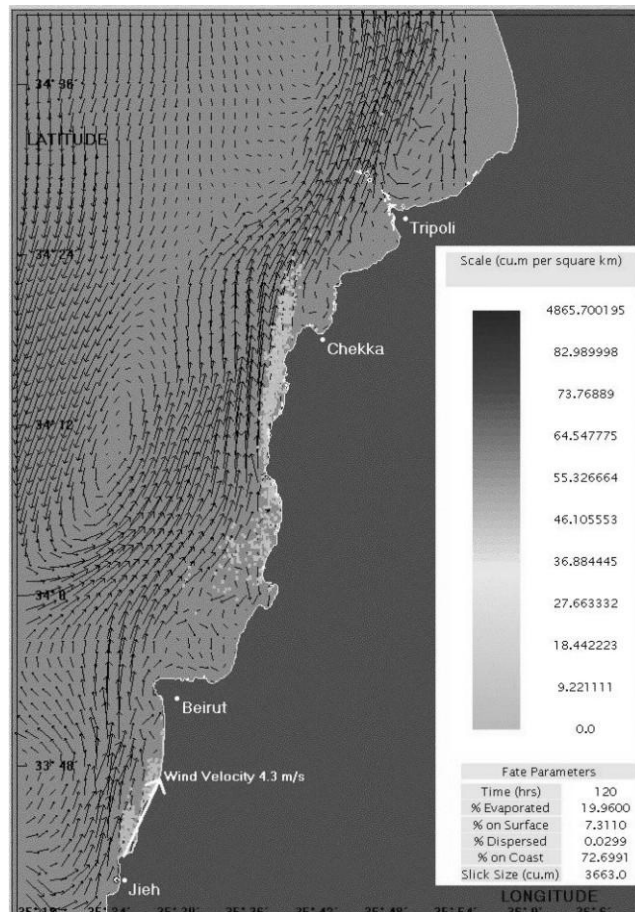


Fig. 1. MEDSLIK predicted slick positions after 5 days from the Lebanese oil spill incident.

References

- 1 - <http://www.oceanography.ucy.ac.cy/cycofos>
- 2 - <http://www.mersea.eu.org>