

OIL SPILL MONITORING USING MODIS THERMAL INFRARED DATA

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Oil is a chemically and physically hazardous substance and is particularly damaging to the marine and coastal environment, fouling marine wildlife and beaches. Oil spills have become a global concern. In order to implement effective oil spill countermeasures, it is necessary to make research on oil spill monitoring. Because of its extensive monitoring area, and its capability to detect spectral characteristics of oil film, remote sensing becomes an important tool to monitor and manage oil spills. Currently, SAR and NIR spectrum character of oil spill are paid more attention, which are mainly used for oil spill positioning. However, Information of oil spill would be more reliable if a combination of thermal infrared bands is used.

As a new developed sensor, MODIS has as many as 36 bands through the whole spectrum, including thermal infrared bands. Due to different thermal radiation properties of oil spill and sea water, they have different surface temperatures. Because of high temperature resolving power of MODIS thermal infrared bands, oil spill and sea water can be distinguished.

In July 13 and 15, 2006, the oil-fueled Jiyeh power plant, located directly on the coastline approximately 30 kilometers (20 miles) south of Beirut, was hit by bombs. The Lebanese Environment Ministry estimates that 30,000 tons of heavy fuel oil was spilled into the sea as a result of the blast, polluting more than 80 kilometers (50 miles) of the Lebanese coastline pushed northward from the Damour region south of Beirut to the Syrian border by south-westerly wind and currents. The study monitored this oil spill event using MODIS.

Based on AVHRR MCSST algorithm, SST (Sea Surface Temperature) algorithm is established using MODIS band 31 ($\lambda = 11.03 \mu\text{m}$) and band 32 ($\lambda = 12.02 \mu\text{m}$). Inversed SST shows not only the temperature difference between sea water and oil film, but also the oil thickness information based temperature difference, which are critical to make effective countermeasures. Results indicate that thermal infrared remote sensing can provide rich information of oil spill, and play an important role in oil spill monitoring.

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