Geophysical Research Abstracts
Vol. 13, EGU2011-13005, 2011
EGU General Assembly 2011

Oil spill remote sensing in the marine environment: MODIS potentialities

barbara bulgarelli (1) and samuel djavidnia (2)

(1) Institute for Environment and Sustainability, Joint Research Centre of the European Commission, 21020, Ispra , Italy (barbara.bulgarelli@jrc.ec.europa.eu), (2) European Maritime Safety Agency, 1249-206, Lisbon, Portugal (samuel.djavidnia@emsa.europa.eu)

With its higher resolution bands, its two daily acquisitions, and the possibility to obtain near real-time data free of charge, the NASA MODIS multispectral optical sensor shows interesting potential as a cost-effective additional tool for oil spill monitoring in the marine environment.
Several MODIS images of both operational (as detected by the EMSA CleanSeaNet service) and accidental oil spills were analyzed to study under which conditions MODIS is able to detect oil features in the sea and which kind of information might be retrieved. The analyzed sample included MODIS images of the accidental oil spill occurred during the Lebanon crisis (summer 2006) and of that generated from the Deepwater Horizon platform in the Gulf of Mexico (April 2010); and MODIS images acquired in coincidence with validated operational oil spills discharged in European waters from 2007 to 2009 (EMSA 2009). Specific attention was focused to define MODIS oil spill detection constraints and which kind of information might be retrieved under the different observed conditions. The whole analysis was carried out making use of the SeaDAS image analysis package (http://oceancolor.gsfc.nasa.gov/seadas/).
The mechanism behind MODIS oil feature detection, as well as the type of information that might be retrieved, strictly depends on the illumination conditions. In presence of sunglint contamination MODIS can locate the oil spill on the same backscattering principle of radar observations and no additional spectral information can be retrieved. The sign of the contrast, which is the same throughout sensor bands, is positive when the feature is observed close to the sun specular position for a flat surface, negative otherwise. Oil detection in absence of sunglint contamination is more difficult. The contrast between an oil feature and its surrounding region may be too weak to be detectable by high resolution low sensitive bands, and/or the oil spill may have an extension not large enough to be detected by low resolution high sensitive bands. The latter consideration holds particularly true for operational oil spills. On the other side, detection in absence of sunglint might give the possibility to retrieve feature optical information, which in turn may help discriminating between oil and look-alike. Careful atmospheric corrections must be performed. Applying the SeaDAS atmospheric correction scheme in its default version (i.e. inferring aerosol properties on a pixel by pixel base from the NIR bands at 748nm and 869nm), may lead to misinterpret sea surface features as atmospheric ones. Cloud coverage remains a big constraint.