Improved Oil Slick Identification Using CMOD5 Model for Wind Speed Evaluation on SAR Images

Horyia Khenouchi and youcef Smara (Algeria)

Key words: Coastal Zone Management; Remote sensing; Risk management; SAR images, oil spill, lookalikes, wind, CMOD4 and CMOD5 models

SUMMARY

The capacity of synthetic aperture radar to observe the sea surface and its potentiality for evaluating the wind vector and for the interpretation of atmospheric and oceanic phenomena make the radar SAR a useful tool in the control and surveillance of oil spill pollution on sea surfaces. The wind is the most important phenomena which affect the appearance of the sea surface on the radar images. It can cause or modify several atmospheric and oceanic phenomena. In particular, the wind can change the shape of oil slicks, or causes lookalikes. The visibility of oil spills and their identification from radar images are particularly dependent on wind speed. For this reason, we've included the wind speed in our identification methodology in order to improve the identification of oil slicks process. Wind speed is calculated using the CMOD4 model. This is a model for evaluation of wind vector, initially developed for radar scatterometers, it gives the backscattering coefficient according to wind speed, wind direction and the angle of incidence. The inversion of the CMOD4 model allows the calculation of wind speed from a SAR image but with an interactive pre-estimate on the image by the operator. This interactive inspection is based mainly on the interpretation of atmospheric phenomena. In this paper we describe the performance of CMOD5 model. CMOD5 was derived to correct for some deficiencies of the currently widely used C-band GMF called CMOD4 with approximation of coefficients. We have used CMOD5 for calculation wind speed and compared it with wind speed calculated from CMOD4 using SAR images which include oil spills and look alikes of the algerian coasts. Validation of our tests shows that CMOD5 is able to largely remove known wind biases in CMOD4. These improvements aid the general usefulness of retrieved SAR images for climate and weather applications, and CMOD5 has now replaced CMOD4 in the operational applications