DeCOP: Detection and characterisation of organic pollution in the coastal environment a synergistic approach

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Abstract

Satellite detection of oil spills with synthetic aperture radar (SAR) has been in quasi–operational use for some time, and now provides reasonably reliable information, particularly when the approximate location and time of the spill is known and data are interpreted by experts. However, the complex nature of the coastal environment still makes the use of SAR to detect oil in these waters a major challenge. The difficulties are particularly great when attempting to monitor chronic pollution from frequent inputs of individually small oil volumes released by marine traffic, tanker and off–shore operations, pipe–line seeps and direct or river–borne waste–water discharges. Yet these smaller spillages are arguably a greater threat to coastal environments than a single, catastrophic spill, and efforts to monitor this type of pollution should be included in an environmental monitoring and information system such as that envisaged for GMES. DeCOP is an ESA–supported project that brings together expertise from five European countries, including the UK, Germany, Portugal, Russia, and the Ukraine. The project addresses the problem of detecting smaller spills and discharges containing oil mixed with water through improving our understanding of the processes that control the formation and movement of oil and other organic slicks, and the factors that determine their appearance in SAR images. The DeCOP project addresses the problem of creating reliable oil detection algorithms by combining the synergistic use of satellite data with experimental studies of marine pollutant films, and mathematical modelling of wave damping by slicks and of the scattering of electromagnetic waves at radar frequencies. Satellite data at optical, infrared and microwave frequencies are used to monitor water quality and provide background information on parameters controlling the formation, transport and evolution of oil slicks. This information is combined with experimental studies that involve the sampling of marine pollutant films and laboratory measurements of their physical characteristics, which influence their wave–damping capacity, and with mathematical modelling of wave damping by organic films, and of the scattering of electromagnetic waves at radar frequencies. The projects philosophy is demonstrated by means of first results of the analyses of satellite data, and from laboratory and field experiments with natural and artificial marine surface films.