



The PRIMI Project: an interdisciplinary approach to oil spill monitoring

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The pilot Project PRIMI, funded by the Italian Space Agency has developed an oil spill monitoring system which makes use of multi-platform SAR and optical data (ERS, ENVISAT, COSMO/SkyMed, MODIS and MERIS) for oil slick detection in the seas around Italy. The combination of SAR and optical satellites ensures a frequent revisit time of any Mediterranean area, as well as high resolution monitoring of the sea surface. SAR detection is based on an original development, within PRIMI, of the OSAD algorithm and SAR imagery also provides innovative information on oil type and age, as well as surface wind and wave fields and ship detection data. The optical satellite imagery is processed with a software developed within PRIMI, which enhances slick-clean sea contrast by eliminating natural oceanographic variability from the top of the atmosphere reflectances, clusters the residual images and selects possible slick candidates on the basis of geometric and spectral criteria, assigning them a score. Both observation systems produce reports with detected slick characteristics, which are automatically received by PRIMI's forecast module. Upon report receipt, the latter produces a slick drift and modification forecast via basin and sub-basin ocean circulation models at different resolutions, as well as an oil slick drift and transformation model stemming from the MEDSLIK model. Oil slick forecast reports are then generated and made available to end users such as environmental maritime authorities and remediation units, together with the previously generated detection reports. Information on oil slicks detected/forecasted by the PRIMI system are stored in an archive module and are accessible via a web GIS system. The system has been validated during a dedicated cruise in August-September 2009 in the Southern Tyrrhenian Sea and the Channel of Sicily with most encouraging results, in that oil slicks were detected in situ very close to the forecast positions and subsequently sampled for hydrocarbons and with drifting buoys, in order to determine the forcing of slick displacement. The PRIMI system architecture, performances, operational activities and validation cruise results are presented here.