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Satellite based Oil Spill Detection and Sea Surface Parameters

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Operational use of satellite data in maritime applications allows to monitor sea waters worldwide.
The needs for prompt detection of oil pollution at sea, affecting safety and marine environment, lead industries to further develop their operational capabilities and technology in order to satisfy the operational Users' requirements: to promptly monitor the area in case of accident, to receive the oil spill detection information in less than 30 minutes from satellite pass, to detect anomalous ship behaviours (e.g. vessels that deliberately "turn off" the identification systems so as to avoid detection), a monitoring capability that is independent from weather conditions and daytime.
Detection of oil pollution at sea is an European effective operational service since 2006, thanks to the European Maritime Safety Agency (EMSA) CleanSeaNet service. Satellite observations of marine oil slicks allow to detect oil spots position, dimension and run forecasting models for oil drifting to help local authorities and the Agency in recovery actions and estimate relevant risks and damages to the environment.
In case of an oil spill pollution emergency occurring both inside and outside European waters, e-GEOS is ready to provide active support in monitoring the evolution of the oil spill. e-GEOS has developed its own capacity to effectively respond to both natural and man made disasters. With particular reference to the oil spill events, such capacity has been demonstrated in several recent occasions, such as
Mexican Gulf oil spill (20th April 2010), Singapore oil spill (25th May 2010), oil spill from a platform in Spain (23rd December 2010).
Emergency response capacity is mostly based on the prompt access to COSMO-SkyMed data, which is a system offering the possibility to task the emergency satellite acquisitions the day before, and so to provide relevant products the day after the service activation.
The knowledge of Sea Surface Parameters is fundamental to properly investigate the oil spill event and foresee the phenomenon evolution in time, in order to better manage recovery actions. In some cases the oil spill detection is in fact very problematic, due to particular sea state and winds conditions.
Operational oil spill detection is currently based on the NRT processing of SAR (Synthetic Aperture RADAR) satellite data, as their Earth surface imaging capability is independent from the day time and meteorological conditions. Passive satellite sensors data are anyway a valuable support to derive ancillary data on the sea state, both in the visible and in thermal bands.
The e-GEOS service chain automatically performs the integration with non-EO met-oceanographic data, deriving both from the SAR image analysis (SAR wind and wave) and from the models (Model Wind and Wave, Sea Surface Temperature, Sea Current). These ancillary data help the operator to improve the detection process and allow to derive the oil spots drifting.
Satellite observations of naval maritime traffic are used to collect information on the position, speed (where the wake is visible) and dimensions of the ships detected, on their time of passage through a given area and on the routes used to cross territorial waters. This process offers the possibility to individuate potential polluters sailing the area in proximity of the oil spill.
New generation satellites, as well as innovative processing tools, allow to increase the systems capability in terms of data availability, resolution, coverage and time-revisit in order to better satisfy the Users needs.
Due to increasing requests for an as much continuous as possible monitoring service, a multi-mission approach is applied in service provision to increase the volume of acquisitions and revisit capability on the target area.