

Abstract

Automatic Ship Detection on the Basis of TerraSAR-X Data

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With the ongoing globalization, ship traffic is continuously rising, demanding for enhanced traffic monitoring to enable safe shipping. In addition, illegal maritime activities and threats have been increasing significantly in recent years calling for enlarged maritime surveillance. As today's monitoring systems, like coastal RADAR and terrestrial AIS (Automatic Identification Signal), have only a limited range of 30 to 40 km, only a small part of the entire exclusive economic zone (EEZ) can be continuously supervised. Therefore, the benefit of the complementary use of Earth observation satellites for maritime surveillance has been recognized.

Infoterra GmbH currently works on the operationalization of a pre-operational ship detection service which has been developed by the German Aerospace Center (DLR). On the basis of SAR (Synthetic Aperture Radar) data, this ship detection service will automatically and continuously provide information on ship movements over large and remote areas and identified hotspots (e.g. typical routes used for smuggling, off-shore wind farms and oil rigs, etc.) in near real time (NRT).

This continuous monitoring service will significantly benefit from the weather and daylight independent monitoring capabilities of TerraSAR-X and subsequent missions in future, e.g. Tandem-X, TerraSAR-X, etc., which will build the backbone of the service, its high repetition rate and spatial resolution, enabling the detection of even small boats.

After being detected in the SAR image, the ship locations will be correlated to AIS / LRIT / VMS information, to identify non-cooperative ships and to evaluate the reliability of the transmitted AIS signal. More over, independently of its degree of reliance, this information can further on be used for the tracking of a suspicious ship during the time intervals when no satellite data becomes available.

Thereby this service acts as early warning and decision support system, to help security authorities to more easily separate friend from suspicious vessels, to which they can concentrate their alertness. Besides this, statistical ship traffic information acquired over long monitoring periods reflects the spatial distribution of intensive ship traffic in the EEZ. Thereby this information can build the basis for maritime spatial planning, e.g. for the designation of areas for the implementation off-shore wind farms, etc..