On the backscattering of offshore platforms via single and dual-polarization TerraSAR-X data

Domenico Velotto(1), Armando Marino(2), Ferdinando Nunziata(3)

(1) German Aerospace Center – IMF-SAR BF, Bremen, GERMANY
(2) Open University – School of Engineering and Innovation, Milton Keynes, U.K.
(3) Università degli Studi di Napoli Parthenope – DiT, Napoli, ITALY

ABSTRACT

The recent discovery of a significant number of oil and gas deposits in the seabed increased the amount of offshore installations [1]. Offshore platforms are potential environmental threats, with chronic oil and gas spillage but also at risk of accident when exposed to extreme weather conditions, e.g. hurricane, or machine failures. Moreover, with the advent of deep water drilling technology, their installation is not fixed to the seabed and their location is not limited to coastal water anymore. For these reasons they are obstacles for yachts, low flying airplanes and merchant ships making at risk the safety of maritime traffic. In conclusion, a system capable of mapping and monitor offshore platform independently of weather condition and wide coverage is needed.

Due to their size and construction material, offshore platforms might be easily detected and mapped by using satellite Synthetic Aperture Radar (SAR) medium resolution imagery [2]. However, the measurements reported in our recent study [3] show that the information provided by backscattered intensity collected in single-polarization is not always sufficient to effectively observe offshore platforms. Exploiting a time series of dual-polarization TerraSAR-X data acquisitions over a cluster of offshore platform in the Gulf of Mexico, different factors affecting the backscattering, including polarization, resolution and incidence angle, are analysed.

Finally in this paper we also address how incoherent and coherent polarimetric observables can be exploited to trigger the detection where the single polarimetric observation may fail.

REFERENCES

[1] “International Energy Agency.” [Online]. Available: http://www.iea.org/.

[2] S. Casadio, O. Arino, and A. Minchella, “Use of ATSR and SAR measurements for the monitoring and characterisation of night-time gas flaring from off-shore platforms: The North Sea test case, “ Remote Sens. Environ., vol. 123, pp. 175–186, Aug. 2012.

[3] A. Marino, D. Velotto and F. Nunziate, “Offshore metallic platforms observation using dual-polarimetric TS-X/TD-X satellite imagery: a case study in the Gulf of Mexico,” IEEE J. Sel. Top. Appl. Earth Obs. Remote Sens., under review, 2016.