Polarimetric backscattering of offshore platforms using dual-polarization TerraSAR-X data

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ABSTRACT
The amount of offshore platform is increasing significantly due to the improvements in drilling technology [1]. In particular, the advances due to deep water drilling technology allows installation to be mobile (to not have a stable location) and to be in regions far from coastal water. Offshore platforms pose a risk to environment with the threat of oil and gas spillage, especially due to their exposition to extreme weather conditions. Besides being a risk to the environment, since their location is not mapped on maps, they are also obstacles for yachts, low flying airplanes and merchant ships in low visibility conditions.

Offshore platforms are generally large metallic constructions, which should make them easily detected and mapped by using satellite Synthetic Aperture Radar (SAR) medium resolution imagery [2]. However, we recently obtained analysed measurements [3] showing that some of the platforms in some acquisition geometries may be invisible in single-polarization backscattering images, leading to miss-detection. On the other hand the detection is still feasible if the dual polarimetric information is used.

In this work we exploiting a time series of dual-polarization TerraSAR-X data acquisitions over a cluster of offshore platform in the Gulf of Mexico. Among others, factors affecting the backscattering include polarization, resolution and incidence angle. Finally in this paper we also address how incoherent and coherent polarimetric observables can be exploited to detect platforms when the single polarimetric acquisition may fail detection.

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