



Monitoring surface displacements from TerraSAR-X and ENVISAT: A comparison on Barcelona, Spain

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The successful launch of TerraSAR-X has made available high resolution Synthetic Aperture Radar images. In particular the following satellite characteristics and its benefits on ground deformation estimation application are evaluated within this work in comparison with four independent ENVISAT tracks:

Wavelength: Compared to the C-band of Envisat and Radarsat, TerraSAR-X operates with a wavelength in the order of 3 cm. A change in the sub-pixel scattering mechanism is expected specially in pure and dense urban areas.

Increased resolution: For ground motion movement this characteristic is of special interest for already built infrastructure monitoring. With more resolution (of about 3 meters per pixel contrasting with the ENVISAT 20 meters resolution) it is expected that the number of possible points of measurement increases as well.

Rapidity of acquisition: Another characteristic that is discussed is the rapid image acquisition (eleven days in comparison with the ENVISAT 35 days). This influences especially in terms of reducing the required time in order to have a stacking of images to perform the measurements and to increase the capability to follow fast movements in time.

The objective of this paper is to present the first experience regarding the impact of these new data in ground deformation estimation applications. A particular case of study in the city of Barcelona will be presented in order to illustrate the findings. Additionally a preliminary geological analysis of the detected surface displacement is presented showing the efficiency and the interest of this new data and processing.