

## **High-Resolution SAR Imagery Range Measurements for Positioning and Monitoring: Status and Prospects**

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### ***ABSTRACT***

The SAR (Synthetic Aperture Radar) imagery are widely used for decades in order to monitor displacements impacting the Earth surface and infrastructures through Differential SAR Interferometry (DInSAR), based on the phase information only. However, it is well known that DInSAR technique may suffer for lack of coherence among the considered stack of images. New Earth observation SAR satellite sensors, as COSMO-SkyMed, TerraSAR-X, and the coming Spanish PAZ, can acquire imagery with high amplitude resolutions too, up to few decimeters. Thanks to this feature, and to the on board dual frequency GPS receivers, allowing orbits determination with an accuracy at few centimetres level, it was proven by different groups that TerraSAR-X and, more recently, COSMO-SkyMed imagery offer the capability to achieve, in a global reference frame, 3D positioning accuracies at few centimeters level. This result can be achieved just exploiting the slant-range measurements coming from the amplitude information, provided a proper corrections of all the involved geophysical phenomena are carefully applied.

Here a review of the present status of this technique, named Imaging Geodesy, is presented, also discussing some results; main open problems are highlighted and future research prospect are addressed.