Geophysical Research Abstracts
Vol. 14, EGU2012-10004, 2012
EGU General Assembly 2012

4D SAR Imaging with Very High-Resolution SAR systems

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The Differential Interferometric Synthetic Aperture Radar (DInSAR) technique is revolutionizing the class of methods used in monitoring ground surface displacements. Specifically Persistent Scatterers Interferometry (PSI) provides accurate localization and monitoring at high resolution. Based on a tomographic approach, 4D (space-velocity) SAR imaging uses both phase and amplitude of the received signal to improve with respect to PSI the monitoring performances in terms of robustness and accuracy and to solve problems of interference of scatterers contribution associated with different structures within the same pixel.
The new generation of high-resolution SAR sensors allows acquiring systematically data with metric/submetric spatial resolution. In this work we present the results of the application 4D imaging techniques to very high resolution TerraSAR-X data acquired over the Musmeci bridge (south Italy) and we show the capability of such technology to accurately monitor even small thermal dilations of the bridge. The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under Grant Agreement nº 225663