

The contribution of Satellite Radar Interferometry for land management activities

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Key-words: Topic: differential synthetic aperture radar interferometry, landslides monitoring, building and infrastructure monitoring.

Interferometric analysis of repeat pass radar images (InSAR) enables the monitoring and identification of changes in the Earth's surface. This new geodetic technique calculates the interference pattern caused by the difference in phase between two images acquired by a spaceborne synthetic aperture radar at two distinct times. The resulting interferogram is a contour map of the change in distance between the ground and the radar instrument. These data represent a useful tool for land management, from natural hazards mitigation to environmental alterations assessment related to anthropogenic activities.

In the last twenty years many applications have been carried out exploiting DInSAR technique: in this work, Satellite Radar Interferometry has been successfully applied as a remote-sensing tool to provide information both on spatial and temporal evolution of surface displacements and on interaction with existing structures/infrastructures in urban areas.

Some case studies of remote sensing applications have been shown. Firstly, a complementary approach to conventional techniques to provide integrated systems for a better investigation of ground instabilities, such as landslides, has been developed. To this regard, radar interferometry can offer a valuable contribution to characterize landslide kinematics, allowing to obtain the most precise information on slope failures mechanisms, including boundary, state of activity, triggering factors and temporal evolution. An other application is referred to show the potentiality of interferometric products for structural health monitoring of man-made constructions, such as buildings, linear infrastructures (roads and bridges) and dams. Historical DInSAR data have permitted to investigate structural performance of these exposed elements, as indicator of their vulnerability, representing a powerful tool for complementing classic forensic analysis.