Geophysical Research Abstracts,
Vol. 11, EGU2009-10540-1, 2009
EGU General Assembly 2009
© Author(s) 2009

Spatial and temporal monitoring of urbanization by Persistent Scatterers Interferometry technique

N. Casagli, S. Del Conte, and C. Proietti

University of Firenze, Earth Sciences Department, Italy (chiara.proietti@unifi.it)

Satellite InSAR (Interferometric Synthetic Aperture Radar) has shown in recent years its capabilities in providing precise measurements of ground displacement. In the case of slow movements (up to few cm/year) affecting urban areas, the multi-interferogram techniques, such as the Permanent Scatterers (PS) (developed by Tele-Rilevamento Europa, a spin-off company of the Politecnico di Milano University), are able to retrieve the spatial distribution of displacements and their evolution along the monitored period.
Thanks to the availability of archive datasets of SAR images acquired by the ERS1/2 satellites (ESA - European Spatial Agency), spanning from 1992 to 2002, and images by RADARSAT-1 (CSA - Canadian Spatial Agency), spanning from 2003-to present, the PS analysis can be applied to provide back analysis and monitoring of ground deformation.
The PS analysis allowed us to detect, characterize and monitor areas affected by ground deformation.
Urban areas present many sites affected by ground movement caused by new surface and underground infrastructures and sediment consolidation processes started with new building works.
The integration of PS data with construction phases, geotechnical deposits properties and recent urbanization plans allows the characterization of deformations caused by new urbanization processes.
The temporal series analysis allowed us to set the construction effects on the surrounding buildings both for superficial and underground urbanization. At a detailed scale, satellite data provide relevant multi-temporal information data to assess spatial and temporal evolution of deformations.
In particular here is presented an innovative post-processing analysis of PS data to individuate anomalies in deformation trends, very useful for emergency real-time forecast and surveillance phases.
The issues also confirm that this chain, from measurements to characterization of new urbanization impact, is a valuable method in deferred time risk management.