Geophysical Research Abstracts, Vol. 7, 10138, 2005
SRef-ID: 1607-7962/gra/EGU05-A-10138

Applications of SAR interferometry from different platforms for landslide monitoring

P. Farina (1), D. Colombo (2), T. Strozzi (3), D. Tarchi (4)

(1) University of Firenze, Earth Sciences Department, Firenze, Italy, (2) TeleRilevamento Europa, TRE, Milano, Italy, (3) Gamma RS, Berna, Switzerland, (4) IPSC, Joint Research Centre, Ispra (VA), Italy (pfarina@geo.unifi.it / Fax: +39 055 2756296 / Phone: +39 055 2756221)

Within the research framework SAR interferometry has been intensely applied in the last years for the monitoring of mass movements. Even though positive results have been achieved in many cases, significant difficulties are found to use this technique as an effective and operational tool for landslide monitoring. Such a situation is partially connected to the acquisition parameters of the current satellite SAR missions, in terms of temporal coverage, incidence angle and wavelength employed and also to the great diversity of mass movements. In particular, the large variability of landslide type and failure geometry, material involved, land cover present on the unstable area, deformation rates and style of activity makes difficult to acquire with continuity robust ground deformation measurements on active landslides.

Here we present some applications of SAR interferometry obtained by using both satellite and ground-based InSAR for the monitoring of different type of landslides. The work aims at showing how some of the InSAR limits can be overcome by selecting different interferometric configurations with respect to the type of phenomenon to be monitored, such as Permanent Scatterers or traditional DInSAR, SAR data in different wavelengths (C-band or L-band) or ground-based InSAR.

The obtained results rely on mass movements located in different geologic environments such as the Alps and the Italian Apennines, and as a consequence characterised by different materials involved in the movement (earth and rock) and by different velocity, from few mm/y up to 1 m/y. For each one of the selected test cases the more suitable interferometric approach has been chosen in order to overcome the possible

technique drawbacks which could be predicted trough the a-priori knowledge of the landslide characteristics. The Permanent Scatterers (PS) approach has been used for the Carbonile landslide, a complex phenomenon located along the Arno River in the Tuscan Apennine. The selection of this type of interferometric configuration has been done for the intense urbanization of the area and for the extremely low deformation rates (up to few mm/y), not measurable through traditional DInSAR.

For the Castagnola landslide, an earth slide located close to the Cinque Terre, an integrated approach, consisting of the combination of PS and DInSAR in C-band has been adopted, allowing the assessment of the deformation field of different sectors of the unstable area.

The Ruinon rock slide, located in the Italian Alps, has been monitored by interferometrically processing L-band data, acquired by JERS, trough the DInSAR method. The use of a longer wavelength has permitted to overcome the problems related to the temporal de-correlation induced by the dense vegetation and to the high velocity of the mass movements. The same landslides has been also monitored by using ground-based InSAR. The obtained measurements shows how this InSAR configuration can be complementary to the satellite one, especially during periods of intensification of the ground movements, when the risk scenarios require a higher frequency of data acquisition.