



Use of differential SAR interferometry for detecting and measuring ground displacement due to a extensive landslide near Niscemi (Sicily, Italy).

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On 12th October 1997, in the proximity of the town of Niscemi (Sicily, Italy), an extensive landslide comprising an area of around 1.5 km² occurred. This event caused damage to agriculture, buildings and the road network.

The aim of this research is to apply an Space-borne InSAR technique to detect and measure ground displacement occurring due to this landslide event.

Most applications of Synthetic Aperture Radar (SAR) only make use of the amplitude information in just one image. Interferometric SAR (InSAR) mainly makes use of the phase measurements in two or more SAR images of the same scene, acquired at two different instants and/or at two slightly different locations.

By interference of the two images, very small slant-range changes of the same surface can be inferred. These slant-range changes can be related to topography and/or surface deformation.

In particular, in this study, four complex SAR image have been considered; two of these acquired by the ERS 2 satellite before and after the landslide event, and two by the ERS 1/2 satellites in tandem mission.

Through these four image we form two InSAR pairs; the first considering the two SAR images acquired by ERS 2 before and after the event, the second through the two images of the tandem mission.

Accordingly, we have formed two interferograms. The tandem-InSAR pair allows us to eliminate the topographic phase term (without the use of a DEM) and allows the construction of an interferometric phase image depending only depends on the ground displacement component.

With the final interferogram we have explored the capacity of the differential technique (Diff-InSAR) to reproduce the ground displacement which has occurred through a comparison with GPS measurements for many points within the scene.