Long term DInSAR analysis of a deep seated gravitative motion in the Alpine region of Val Di Susa, Italy

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Abstract

The occurrence of deformation processes acting on an Alpine slope was detected during the excavation of an hydraulic tunnel and investigated in this work by means of a DInSAR multitemporal analysis. The availability of ERS–SAR data since 1992 and the characteristics of the expected results were considered to significantly improve the information obtainable from ground based measurements, which can be performed at lower temporal frequency and on few sites located in the lower part of the slope. The slope under investigation (a surface of about 40 km\(^{2}\) ranging from 1000 to 3500 m a.s.l. with an average slope angle of 32\(^{\circ}\)) corresponds to the northern flank of the Val Di Susa (Torino), between the towns of Oulx and Salbertrand. The slope was already affected by very large landslides and it still shows evidences of deep seated gravitative motions. The multitemporal analysis of SAR data was carried out with the SBAS Small BAseline Subset) algorithm developed at IREA–CNR (Naples). Since the investigated area is characterized by very bad conditions in terms of interferometric processing (thick vegetation, presence of snow and fog, rough and steep topography) only 16 ERS images from an ascending track were found to be suitable. 39 interferograms were extracted and combined to obtain the mean velocity field for each coherent pixel. Unfortunately, only few points over the slope turned out to be temporally coherent, preventing from having a continuous map of the slope displacement. Other connected phenomena were observed in the same zone, such as a subsidence motion of the bottom valley and the presence of other active slow landslides in the surrounding slopes.