



Integration of X-band SAR interferometry, continuous and periodic D-GPS and in-place inclinometers to characterize and monitor a deep-seated earthslide in the Dolomites (Italy)

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The Corvara landslide is an active, large-scale, deep-seated and slow moving earthslide of about 30 Mm³ located in the Dolomites (Italy). It is frequently damaging a national road and, occasionally, isolated buildings and recreational ski facilities. Since the mid '90s it has been mapped, dated and monitored thanks to field surveys, boreholes, radiocarbon dating, inclinometers, piezometers and periodic D-GPS measurements, carried out by the Geology and the Forestry Planning offices of the Autonomous Province of Bolzano, the Municipality of Corvara in Badia, the University of Modena and Reggio Emilia, the IRPI-CNR of Padua. In 2013, a new phase of characterization and monitoring has started which also involves the EURAC's Institute for Applied Remote Sensing, the geodesy group of University La Sapienza, the CNR-IREA of Naples and the Leica Geosystems office in Italy.

This new phase of characterization and monitoring is meant to investigate the opportunities of innovative SAR interferometry, D-GPS and in-place inclinometers techniques to provide for a high frequency monitoring of the study site in support to the analysis of the investigation of forcing factors leading unsteady, nonuniform landslide motion through different seasons of the year. Monitoring results are also expected to provide a validation of innovative interferometric techniques so to fully evaluate their conformity to be used as a long-term monitoring system in land-use planning and risk management procedures. The monitoring infrastructure now integrates: 16 Corner Reflector for satellite X-Band SAR interferometric products, 13 benchmarks for D-GPS periodic surveys, three on-site GPS receivers for continuous positioning and remote ftp data pushing, two in-place inclinometers and a pressure transducer to record pore-pressure variations. The coupling of SAR-based products with GPS records is achieved using especially designed Corner Reflectors having an appendix dedicated to hold Dual-Frequency GPS antennas. COSMO-SkyMed X-Band SAR acquisitions started on October 2013 and are ongoing with a temporal resolution of 16 days using STRIPMAP (HIMAGE) measuring mode. Discontinuous D-GPS Fast-Static surveys are scheduled with a triple frequency: annual for 24 points outside recent activation areas, monthly for 13 points in the active zone and a bi-weekly for 6 points located in the most active zone. Displacement high-frequency data are acquired thank to the installation of 3 Dual-Frequency GPS in permanent acquisition that have been located in the accumulation, track and source zone of the active portion of the landslide. High frequency data are also obtained by the two inclinometers operating in continuous acquisition located across the main slide surface at 48 m depth into a 90 m borehole drilled in the accumulation zone. A piezometer installed in the source zone and the meteorological station of Piz La Ila (3 km far away) of the Autonomous Province of Bolzano complete the system.

The poster presents the infrastructural details of the monitoring network, the technical characteristics of data acquisition systems, the data processing procedures and the latest ongoing results.