LANDSLIDE MONITORING AT REGIONAL AND LOCAL SCALE WITH RADAR SATELLITES

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We apply different type of remote sensing techniques for landslide surveillance at different scales. At regional scale the short repeat cycle and regularity of acquisitions of Sentinel-1 are exploited to continuously monitor ground deformation induced by landslides. Sentinel-1 mission is composed of a constellation of two twin satellites that share the same orbital plane and ensure a unique revisiting time of 6 days optimised for InSAR applications. The study area selected is the Tuscany region. For the initial implementation of the continuous monitoring of the Tuscan Region, the existing archives of the Sentinel-1A were acquired and then processed by means of a multi-interferometric approach, specifically designed to analyze long series of SAR scenes. Once a new Sentinel-1 image is available, it is automatically downloaded and added to the existing archive. The new data stack is then entirely reprocessed to generate new ground deformation maps and updated displacement time series. A series of subsequent updating is created every six days using Sentinel-1A and Sentinel-1B images. Following the creation of updated ground deformation maps, displacement TS of each measurement point for both ascending and descending geometry are systematically and automatically analyzed to identify, in the last 150 days of the TS, any change in the deformation pattern. Field investigations are performed in these areas at potential risk and, if necessary, they are targets for detailed analysis with high resolution sensors (e.g., COSMO-SkyMed) or and to create a virtual constellation, where different satellite data sources are used in synergy to create a more effective and robust Earth observation system. At local scale the project aims to integrate the satellite displacements information with high spatial and temporal resolution monitoring techniques such as ground-based radar interferometry (GB-InSAR) and the Saturn drone equipped with different sensors. The GB-InSAR is well-established technique to monitor landslides and to set up early warning systems. The Saturn drone, patented and developed by our team, has an innovative circular shaped airframe that fully supports flight dynamics.