Landslides Investigation using Statistical Analysis of Permanent Scatterers: Case Study in the Arno River Basin

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Permanent Scatterers Synthetic Aperture Radar Interferometry (PSInSAR) is a promising technique for detecting and monitoring slow landslides movement. As an instance, in the European Space Agency (ESA) SLAM project (Service for Landslides Monitoring), by virtue of the Permanent Scatterers (PS) processed from 10 years (1992-2002) ERS1 and ERS2 satellite images, more than 27,000 individual landslides were confirmed or modified within the Arno river basin which is located in the Central-Northern Apennine in Italy. Our studies, on the basis of the previous ESA-SLAM outcomes, tended to update the landslides investigation results at the basin scale, by using the statistical approach. PS outputs spanning from the year 2003 to 2006 processed from the higher temporal resolution (24 days) RADARSAT satellite images were utilized. In addition, the Getis-Ord G statistic, which is implemented in ArcGIS Hot Spot Analysis toolset, is used for assessable cluster detection that defines the velocity of PS as a weighted set of features. The high G-statistic result indicates the cluster of relatively high-speed mass movement whereas the low output tells the cluster of slow mass movement. The PS along with the G-statistical information is expected to provide the more efficient and reliable support in terms of rapid landslides mapping and meanwhile shows the tendency of potential (semi-) automatic mapping approach.