

REMOTE SENSING TECHNIQUES FOR LANDSLIDE RISK ANALYSIS: FIRST OUTCOMES FROM THE ESA/SLAM PROJECT

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The SLAM project (Service for Landslide Monitoring), was launched in 2003 by the European Space Agency (ESA) for the definition of a service based on the integration of EO-data within the current practices of landslide mapping and monitoring. In the framework of such a project the Permanent Scatterers processing and the analysis of high resolution images (e.g. SPOT5 and aerial-photos) have been performed at a basin scale, on the whole territory of the Arno River basin (Central Italy). The drainage basin of the Arno River is almost entirely situated within Tuscany. The river is 241 km long, while the catchment has an area of about 8830 km² and a mean elevation of 353 m a.s.l. The catchment area is located within the mountain belt of the Northern Apennines. The test basin has been chosen for the presence of a high number of mass movements (up today about 300 areas at high landslide risk and more than 20,000 individual landslides have been mapped from the institutional authorities) and for its significance with respect to the Italian Apennine territory, in terms of landslide type and environmental conditions. By considering the technical requirements imposed by the Italian legislation for the documents related to landslide risk management, three products based on EO-data have been defined related to landslide inventory mapping, landslide hazard mapping and landslide monitoring. To this aim, about 350 SAR images have been interferometrically processed by means of the PS technique, detecting about 600,000 PS. The processing of SPOT5 images and aerial-photos, still in progress, have been performed for the extraction of features related to the landslide presence, useful for the geomorphological analysis and, as a consequence in order to give a spatial meaning to the punctual information provided by the PS. This procedure has been coupled with an intense geological interpretation phase characterized by the analysis of traditional in situ monitoring data, ancillary data and the performing of field surveys. The final results will impact on the current instruments used by the Arno Basin Authority for the landslide risk management (e.g. Hydrogeological Structure Plan - Piano per l'Assetto Idrogeologico - PAI) representing one of the first examples in Europe of full integration of remote sensing data into land regulations concerning landslide hazard.