

Innovative methodologies for earthquake damage mapping: the APhoRISM outcomes

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Prompt response after a seismic event is of primary importance to save lives and effectively manage the emergency. A rapid damage mapping can provide a valuable support to rescue teams and to all the stakeholders involved in the emergency management. Satellite remote sensing has already proved its potentiality to contribute to post-earthquake damage assessment. Further development will allow obtaining more reliable results in term of damage prediction from satellite data.

Towards that, the European Commission, EC, funded the research project APhoRISM Advanced PRocEDURE for Seismic and volcanic Monitoring (www.aphorism-project.eu). APhoRISM is a 3 years project, started on December 2013, under the Frame Programme 7, Research, Technological Development and Demonstration Activities.

APhoRISM aims at developing innovative methods, based on multi-sensors and ground data, to provide improved products for two thematic applications: earthquake damage mapping and volcanic ash characterisation.

The present work focuses on the seismic products of the project, in particular, on the method developed to integrate satellite-derived features for change detection, geological and seismic vulnerability of ordinary buildings. The method, referred to as APE – “A-Priori information for Earthquake damage mapping” exploits: change detection maps calculated from satellite imagery, including optical and synthetic aperture radar (SAR) images; and a-priori information including geological data (such as soil type, landslide and liquefaction susceptibility) and data on building structural, geometric and constructive characteristics. The main steps to develop APE include: 1) a detailed analysis for identifying the best performing damage indexes from satellite imagery, 2) the selection of an appropriate approach for fusing a-priori information and change detection maps.

The goal of APE is the generation of two types of damage maps, i.e. a map at single building scale and a map at group of buildings scale.

The results collected during the project lifetime are presented and discussed in this paper. They are related to three case-studies, namely: the L'Aquila earthquake that hit central Italy on April 2009; Port-au-Prince, Haiti, damage mapping after the January 2010 seismic event, and Christchurch (New Zealand) earthquake sequence 2010-2011.