PREVIEW Service 2: Forecasting Shallow Rapid Landslides

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PREVIEW (Prevention, Information and Early Warning, pre-operational services to support the management of risks) is an European Commission FP6 Integrated Project with the aim of developing, at a European level, innovative geo-information services for atmospheric, geophysical and man made risks. Within this framework, Service 2 (Prediction of shallow rapid slope movements) of the Landslides Platform has the objective of developing an integrated procedure for the forecasting and warning of distributed shallow landsliding to be used for civil protection purposes. The service will blend advanced techniques from different fields and involving different tools: meteorology, hydrology, geologic modelling, remote sensing and GIS.

The service is being developed in two pilot test sites in Italy, the Armea river basin, located in the Province of Imperia, Liguria, in NE Italy, and the entire Ischia Island, in the Gulf of Naples.

Two field campaigns on each test site have been carried out for collecting data for the development and calibration of the models that will be applied within the service.

A distinctive feature of the service being developed is the use of an innovated soil depth model for predicting the distributed thickness of the soil (depth-to-bedrock) within the basin, one of the most important parameters controlling shallow landslide triggering. Data from a probabilistic downscaled short term rainfall forecast will be used to estimate soil saturation and meteorological radar outputs will be employed to determine overall system evolution in the very short term (less than 6 hours lead time). The final step regards the use of hydrogeological modelling to calculate the distributed factor of safety on a pixel-by-pixel basis. The infinite slope model of Skempton and Delory is used for this purpose.

On the Armea valley, the topographic base that will be used for the modelling is a DEM with a cell size of 5 m specifically created for this purpose by digitizing a large scale raster contour map. The area is characterised by calcareous and arenaceous terrains, with colluvial deposits of variable thickness. Calibration of the service will be performed with two rainfall events: one that occurred in 2000, which triggered numerous superficial landslides but for which the rainfall data is less well-known and a smaller, more recent event (2006) that caused fewer landslides but for which more

information is available, including a high-resolution optical satellite image.

For the Ischia Island is available a very detailed topographic base in vectorial format and a DEM with the same resolution (5 m) of the Armea valley has been created. The entire island is a volcanic complex, with many different terrains, as ashes, pumices and lavas. The calibration will make use of the 30 April 2006 event data, when an exceptional precipitation triggered few landslides in the Monte Vezzi area, with catastrophic consequences (four people were killed in their home). In this case hourly rainfall data are available and a lot of terrain parameters (topographic, geological and geotechnical) have been collected during the fieldwork.

Once fully developed the entire service will run within a real-time updated WebGIS system so that end-users involved in PREVIEW can interactively access, query and download data.