Geophysical Research Abstracts
Vol. 15, EGU2013-8004, 2013
EGU General Assembly 2013

PRESSCA: A regional operative Early Warning System for landslides risk scenario assessment

Francesco Ponziani (1), Marco Stelluti (1), Nicola Berni (1), Luca Brocca (2), and Tommaso Moramarco (2)

(1) Regione Umbria, Civil Protection, Foligno, Italy, (2) National Research Council, Research Institute for Geo-Hydrological Protection, Perugia, Italy

The Italian national alert system for the hydraulic and hydrogeological risk is ensured by the National Civil Protection Department, through the "Functional Centres" Network, together with scientific/technical Support Centres, named “Competence Centres”. The role of the Functional Centres is to alert regional/national civil protection network, to manage the prediction and the monitoring phases, thus ensuring the flow of data for the management of the emergency. The Umbria regional alerting procedure is based on three increasing warning levels of criticality for 6 sub-areas ($\sim$1200 km^2). Specifically, for each duration (from 1 to 48 hours), three criticality levels are assigned to the rainfall values corresponding to a recurrence interval of 2, 5, and 10 years. In order to improve confidence on the daily work for hydrogeological risk assessment and management, a simple and operational early warning system for the prediction of shallow landslide triggering on regional scale was implemented. The system is primarily based on rainfall thresholds, which represent the main element of evaluation for the early-warning procedures of the Italian Civil Protection system.

Following previous studies highlighting that soil moisture conditions play a key role on landslide triggering, a continuous physically-based soil water balance model was implemented for the estimation of soil moisture conditions over the whole regional territory. In fact, a decreasing trend between the cumulated rainfall values over 24, 36 and 48 hours and the soil moisture conditions prior to past landslide events was observed. This trend provides an easy-to-use tool to dynamically adjust the operational rainfall thresholds with the soil moisture conditions simulated by the soil water balance model prior to rainfall events. The application of this procedure allowed decreasing the uncertainties tied to the application of the rainfall thresholds only.

The system is actually operational in real-time and it was recently coupled with quantitative rainfall and temperature forecasts (given by the COSMO ME local scale models for Umbria) to extend the prediction up to 72 hours forecast. The main output is constituted by four spatially distributed early warning indicators (normal, caution, warning, alarm), in compliance with national and regional law, based on the comparison between the observed (forecasted) rainfall and the dynamic thresholds. The early warning indicators, calculated over the whole regional territory, are combined with susceptibility and vulnerability layers using a WEB-GIS platform, in order to build a near real time risk scenario. The main outcome of the system is a spatially distributed landslide hazard map with the highlight of areas where local risk situations may arise due to landslides induced by the interaction between meteorological forcing and the presence of vulnerability elements. The System is inclusive of specific sections dedicated to areas with specific risks (as debris flows prone areas), with specific thresholds.

The main purpose of this study is firstly to describe the operational early warning system. Then, the integration of near real-time soil moisture data obtained through the satellite sensor ASCAT (Advanced SCATterometer) within the system is shown. This could allow enhancing the reliability of the modelled soil moisture data over the regional territory. The recent rainfall event of 11-14 November 2012 is used as case study. Reported triggered landslides are studied and used in order to check/refine the early warning system.