

## 2010 AGU Fall Meeting

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### **A national early warning system for rainfall-induced landslides in Italy**

*F. Guzzetti<sup>1</sup>; M. Rossi<sup>1</sup>; S. Peruccacci<sup>1</sup>; M. Brunetti<sup>1</sup>; I. Marchesini<sup>1</sup>; F. Ardizzone<sup>1</sup>; V. Balducci<sup>1</sup>; C. Bianchi<sup>1</sup>; M. Cardinali<sup>1</sup>; F. Fiorucci<sup>1, 2</sup>; A. Mondini<sup>1, 2</sup>; P. Reichenbach<sup>1</sup>; P. Salvati<sup>1</sup>; G. Tonelli<sup>3</sup>; D. Dello Buono<sup>4</sup>; F. Izzzi<sup>4</sup>; L. Amato<sup>4</sup>; G. La Scaleia<sup>4</sup>; D. Maio<sup>4</sup>; P. Pagliara<sup>5</sup>; B. De Bernardinis<sup>5</sup>*

1. Consiglio Nazionale delle Ricerche, Istituto di Ricerca per la Protezione Idrogeologica, Perugia, PG, Italy.
2. Dipartimento di Scienze della Terra, Università degli Studi di Perugia, Perugia, PG, Italy.
3. Gabriele Tonelli, San Lazzaro di Savena, BO, Italy.
4. Consiglio Nazionale delle Ricerche, Istituto di Metodologie per l'Analisi Ambientale, Tito Scalo, PZ, Italy.
5. Presidenza del Consiglio dei Ministri, Dipartimento della Protezione Civile, Roma, RM, Italy.

In Italy, intense or prolonged rainfall is the primary cause of landslides, and rainfall-induced slope failures occur every year, claiming lives, causing economic disruption, and producing environmental problems. In 2009, rainfall-induced landslides in Italy have caused more than 200 casualties (deaths, missing persons, injured people), in multiple landslide events. In the period 1950-2009, the average yearly number of harmful landslide events has exceeded 35, most of which were rainfall-induced landslide events. These figures indicate the impact that rainfall-induced landslides have on the population of Italy. The Italian national Department for Civil Protection (DPC), an Office of the Prime Minister, and the Research Institute for Geo-Hydrological Protection (IRPI), of the Italian National Research Council (CNR), have designed and implemented a prototype system to forecast the possible occurrence of rainfall-induced landslides in Italy. The system is based on two main components. The first component consists of: (i) a set of national, regional, and local rainfall thresholds (of the intensity-duration (ID) type) for possible landslide occurrence, (ii) a database of sub-hourly rainfall measurements obtained by a nationwide network of 1950 rain gauges, and (iii) a database of daily quantitative rainfall forecasts obtained through numerical modelling. Every day, and for each individual rain gauge, the system compares the measured and the forecasted rainfall amounts against pre-defined thresholds, and assigns to each rain gauge a probability of possible landslide occurrence. This information is used to prepare synoptic-scale maps showing where rainfall induced landslides are expected, in a period of time. The second component of the system consists of synoptic assessments of landslide hazard and risk in Italy, including small-scale maps. The assessments were obtained through the statistical modelling of thematic and environmental information, including national catalogues of historical landslides and of historical landslides with human consequences in Italy, in the period 1900-2005. Combination of the hazard and risk zonations with the daily forecasts for possible landslide occurrence, allows the Italian national Department for Civil Protection to better manage potential landslide risk in Italy. The system, based primarily on open source software, automatically generates standard OGC web services (WMS, WFS, WCS services) displayed using state-of-the-art Web-GIS technology.

### **Contact Information**

Fausto Guzzetti, Perugia, Italy, 06128, [click here](#) to send an email