The Generalized FLaIR Model (GFM) for landslide forecasting

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A new version of the hydrological model named FLaIR (Forecasting of Landslides Induced by Rainfall, Capparelli and Versace 2011) is proposed, named as GFM (Generalized FLaIR Model). Non stationary rainfall thresholds, depending on antecedent precipitation, are introduced in this new release, which allow for a better prediction of landslide occurrences. It is possible to demonstrate that GFM reproduces all the Antecedent Precipitation models (AP) proposed in technical literature as particular cases, besides Intensity-Duration schemes (ID) and more conceptual approaches, whose reconstruction with the first release of FlaIR model, which adopts only stationary thresholds, was already discussed in Capparelli and Versace (2011). GFM is extremely flexible, and the main advantage of the model is represented by the possibility of using well-established procedures for the choice of the most appropriate configuration for the selected case study, and of facilitating the comparison between several options, through the use of a mobility function. Gimigliano municipality, located in Calabria region (southern Italy) was chosen as case study, where a consistent number of landslides occurred in the past years; in particular, during the period 2008-2010 this area (like the whole Calabria region) was affected by persistent rainfall events, which induced several damages related to infrastructures and buildings. For the selected case study GFM allows to obtain significant improvements in landslide prediction; in details a substantial reduction of False Alarms is obtained with respect to application of classical ID and AP schemes.

REFERENCES
Capparelli G, Versace P (2011). FLaIR and SUSHI: Two mathematical models for Early Warning Systems for rainfall induced landslides. Landslides 8:67-79. doi: 10.1007/s10346-010-0228-6