Geophysical Research Abstracts
Vol. 16, EGU2014-964, 2014
EGU General Assembly 2014
© Author(s) 2013. CC Attribution 3.0 License.

Towards a debris-flow warning system based on hydrological measurements of the triggering conditions. A study of El Rebaixader catchment (Central Pyrenees, Spain)

Clàudia Abancó, Marcel Hürlimann, and José Moya
Technical University of Catalonia, Geotechnical Engineering and Geosciences, Barcelona, Spain (claudia.abanco@upc.edu)

Debris flows represent a risk to the society due to their high destructive power. Rainfall is the main debris-flow triggering factor. Rainfall thresholds are generally used for warning of debris flow occurrence in susceptible catchments. However, the efficiency of such thresholds for real time hazard assessment is often conditioned by many factors, such as: the location and number of the rain gauges used (both to define the thresholds, and for setting off warnings); the temporal and spatial evolution of rainfall's convective cells or the effect of snow cover melting. These factors affect the length of the warning time, which is of crucial importance for issuing alert messages or alarms to the people and infrastructures at risk.

The Rebaixader catchment (Central Pyrenees, Spain) is being monitored since 2009 by six stations recording information on initiation (4 stations) and flow detection and cinematic behaviour (2 stations). Until December 2013, 7 debris flows, 17 debris floods and 4 rockfalls have been recorded.

The objectives of this work were: a) the definition of rainfall thresholds at two different rain gauges; b) the analysis of the infiltration patterns in order to define their potential use for warning systems and c) preliminary testing of rainfall thresholds' efficiency in terms of warning time, in this catchment. This last goal consisted in the comparison of the time elapsed between the rainfall threshold was exceeded and the event occurrence was detected by the stations at the channel area.

The results suggest that the intensity-duration rainfall thresholds sometimes provide warning times which would be too short for an adequate reaction in the Rebaixader catchment (less than 10 minutes). The combination of such rainfall thresholds with infiltration measurements is useful to increase the warning time. This occurs especially in the events triggered in spring, when the snowmelt plays an important role in the event's triggering conditions. However, the effects of infiltration associated to the summer convective rainfalls are almost imperceptible; therefore their importance in warning systems decreases.