Rainfall thresholds for debris-flow early warning: application to North-East Sicily area

David J. Peres and Antonino Cancelliere

University of Catania, Department of Civil and Environmental Engineering, Catania, Italy (djperes@dica.unict.it)

In landslide-prone areas, extreme rainfall can lead to debris flow, causing more devastating effects than floods. Early warning systems, based on empirical or physically-based models of landslide triggering, have been activated throughout the world, with the purpose to reduce the damage that landslides cause by anticipating civil protection measures.

On 1st October 2009, a diffused debris-flow phenomena occurred in the North-Eastern Sicilian coastal area, which is landslide-prone for the presence of the over-slopped Peloritan mountains. More than 600 landslides occurred in an area less than 60 km2, causing 37 deaths and invaluable damage in the nearby urban areas.

In the present work, methodologies to formulate in an empirical fashion site-specific rainfall thresholds for the initiation of landslides have been applied to the above mentioned area, making use of representative observed rainfall time series and knowledge of past landslide events. Specifically, a threshold in terms of rainfall characteristics has been searched and the FLaIR model, proposed by Sirangelo and Versace (1992) and used as a basis in the realisation of several early warning systems in Italy, has been implemented and adapted to the study-case.

The results of this preliminary analysis can find application in view of the development of a a landslide early warning system in the area.