



Empirical rainfall thresholds for the triggering of landslides in Asturias (NW Spain)

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Rainfall-triggered landslides are common and widespread phenomena in Asturias, a mountainous region in the NW of Spain where the climate is characterized by average annual precipitation and temperature values of 960 mm and 13.3°C respectively. Different types of landslides (slides, flows and rockfalls) frequently occur during intense rainfall events, causing every year great economic losses and sometimes human injuries or fatalities. For this reason, its temporal forecast is of great interest.

The main goal of the present research is the calculation of empirical rainfall thresholds for the triggering of landslides in the Asturian region, following the methodology described by Zêzere et al., 2015. For this purpose, data from 559 individual landslides collected from press archives during a period of eight hydrological years (October 2008-September 2016) and gathered within the BAPA landslide database (<http://geol.uniovi.es/BAPA>) were used. Precipitation data series of 37 years came from 6 weather stations representative of the main geographical and climatic conditions within the study area. Applied methodology includes: (i) the definition of landslide events, (ii) the reconstruction of the cumulative antecedent rainfall for each event from 1 to 90 consecutive days, (iii) the estimation of the return period for each cumulated rainfall-duration condition using Gumbel probability distribution, (iv) the definition of the critical cumulated rainfall-duration conditions taking into account the highest return period, (v) the calculation of the thresholds considering both the conditions for the occurrence and non-occurrence of landslides.

References:

Zêzere, J.L., Vaz, T., Pereira, S., Oliveira, S.C., Marqués, R., García, R.A.C. 2015. Rainfall thresholds for landslide activity in Portugal: a state of the art. *Environmental Earth Sciences*, 73, 2917-2936. doi: 10.1007/s12665-014-3672-0