



## Development of an early warning system for precipitation triggered landslides in Portugal

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Landslides are phenomena that can induce catastrophic consequences and human losses. Landslides occurred in the region north of Lisbon during the last 50 years were induced by rainfall, and landslide activity has been confined to very wet periods (Zêzere et al., 2005). The prediction of landslides triggered by precipitation requires a comprehensive knowledge of geomorphological characteristics and, additionally, an accurate forecast of the atmospheric conditions associated (e.g. precipitation). However, the ability to predict precipitation at fine-scale remains a challenge in atmospheric modelling, because of the contribution of very fine-scale processes due to orography and convection, and their non-linear interactions with the larger scale processes. This work describes the early stages of a forecasting system of landslides based on two distinct, but complementary components; 1) regional modelling of precipitation for central Portugal at fine-scale with the regional climate model WRF and 2) a landslides alert model developed and validated at the Centre of Geographical Studies of University of Lisbon (Zêzere et al., 2005) that has shown its added value for landslide events occurring outside its calibration/validation period (Zêzere et al., 2008). The system is applied to model landslides over Portugal in particular for those events that occurred more recently (March/October/November 2006 and February 2008) periods. It allows predicting multiple landslides, their time occurrence and their location at fine-scales. We evaluate then, the performance and uncertainties of our system by comparing modelled results with different configurations of WRF and observed daily accumulated precipitation over 20 measurement stations in the region of Lisbon and 115 rainfall-triggered landslides, which is necessary in order to use it in an operational system.