



Which is the best mapping unit for a regional scale landslide early warning system? Comparison between pixel and polygons for Catalonia.

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Mitigating the risk due to shallow landslides and debris flows at a regional scale is challenging. Landslide Early Warning Systems (LEWS) aim at predicting the time and location of upcoming events. Usually LEWS use information on terrain susceptibility to determine the prone areas and rainfall observations to depict when an event can be triggered. The majority of LEWS employ pixel-based susceptibility maps, but some others use maps based on other terrain map units such as hydrological catchments. However, the effect of using a mapping unit or another in the resulting warnings has not yet been analyzed.

Our objective was to evaluate the influence of the terrain map unit in the context of a regional LEWS. To do so we employed a simple methodology to obtain susceptibility maps for early warning system purposes. The susceptibility assessment uses a fuzzy logic approach to combine land cover and terrain slope maps. The methodology can be easily used in other regions.

The susceptibility maps for the region of Catalonia have been obtained using (i) grid-cells of different resolutions, and (ii) a subdivision of the domain in hydrological basins. These maps have been validated by means of ROC analysis.

The LEWS has been set up and tested with the different susceptibility maps. To determine the most suitable mapping unit, the LEWS outputs have been compared in terms of: (i) evaluation of the model performance during past events, (ii) computational time, and (iii) end-user ease of interpretation.

Raster maps have higher resolution than catchment-based maps. However, they lack physical meaning, are more difficult to interpret, and require longer computational times than maps based on basins. The choice of the most adequate mapping unit is delicate. From a scientific point of view hydrological catchments seem better, but the final decision must be taken including the opinion of stakeholders like civil protection.