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Rainfall thresholds estimation for shallow landslides in Peru from gridded daily data

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Abstract. The objective of this work was to generate and evaluate regional rainfall thresholds obtained from a combination of high-resolution gridded precipitation data (PISCOpd_Op), developed by the National Service of Meteorology and Hydrology of Peru (SENAMHI), and information from observed shallow landslide events. The landslide data were associated with rainfall data, determining triggering and non-triggering rainfall events with rainfall properties from which rainfall thresholds were determined. The validation of the performance of the thresholds was carried out with events that occurred during 2020 and focused on evaluating the operability of these thresholds in landslide warning systems in Peru. Thresholds were determined for 11 rainfall regions. The method of determining the thresholds was based on an empirical-statistical approach, and the predictive performance of the thresholds was evaluated from the “true skill statistics” (TSS) and the area under the curve (AUC). The best predictive performance was obtained by the mean daily intensity-duration ($I_{mean} - D$) threshold curve, followed by accumulated rainfall E . This work is the first attempt to estimate regional thresholds on a country scale in order to better understand landslides, and the results obtained reveal the potential of using thresholds in the monitoring and forecasting of shallow landslides caused by intense rainfall and in supporting the actions of disaster risk management.

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