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Integration of multiple observed and model-derived hydrological variables in landslide initiation threshold models in Rwanda

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This study was conducted using data collected from 3 catchments in North-Western region of Rwanda; Kivu, upper Nyabarongo and Mukungwa. We used two parsimonious models, a transfer function noise time series model and a linear reservoir conceptual model, to simulate groundwater levels using rainfall and potential evapotranspiration as model inputs. The transfer function noise model was identified as the model with great explanatory predictive power to simulate groundwater levels as compared to the linear reservoir model. Hereafter, the modelled groundwater levels were used together with precipitation to explain the landslide occurrence in the studied catchments. These variables were categorized into landslide predisposing conditions which include the standardized groundwater level on the landslide day h_t and prior to landslide triggering event h_{t-1} and landslide triggering conditions which include the rainfall event, event intensity and duration. Receiver operating characteristics curve and area under the curve metrics were used to test the discriminatory power of each landslide explanatory variable. The maximum true skill statistics and the minimum radial distance were used to highlight the most informative hydrological and meteorological threshold levels above which landslide are high likely to occur in each catchment. We will discuss our results of incorporation of groundwater information in the landslide predictions and compare these results with landslide prediction capacity which solely use of precipitation thresholds.Here we focus on at the same time on the practicalities of data availability for day-to-day landslide hazard management, both in terms of missed and false alarms