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Analysis of runout length of debris flows based on catchment-scale model of hydrologcially-induced shallow landslides

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Rapid debris flows represent a destructive and long range natural hazard in mountainous regions. The study capitalizes on a catchment-scale landslide hydrological-triggering model' (CLHT) which provides input volumes and locations of landslides that are likely to generate debris flows. The model describes the progressive weakening of the soil which may abruptly fail, forming highly localized patterns as observed in inventories. These landslide volumes provide input to physically-based analytical runout models for debris flows. The hybrid model was applied to an event-based landslide inventory in which prolonged rainfalls in 2005 triggered 44 shallow landslides in partially forested area, resulting in the release of a large amount of debris flows. We studied the effect of root-reinforcement on landslide volume and compared simulated size-frequency distribution with inventory data. These soil volumes and their rheological state were used in the analytical runout model to estimate runoff and damage by debris flows. Consideration of topography driven runout pathways are discussed and compared with airborne images of debris flow paths.