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Characterization of the hazard caused by mobile debris flows released from large landslides using runout modellling.

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Clayey flow-like landslides are characterized by their capability to suddenly change behaviour. Under specific hydrogeological conditions, such landslides can fluidize and transform into induced debris-flows. Due to their sediment volume, and their high mobility, such debris-flow can pose serious hazards on the alluvial fans.
The objective of this work is to propose a methodology to evaluate the hazards using numerical runout models. First, a reference event of a fluidization that occurred at the large La Valette landslide (South French Alps) is presented. Second, the numerical runout model Mass-Move is used to reproduce the characteristics (runout distance, deposit height, velocity) of the reference event. Third, runout scenarios are computed for different triggering conditions (volume, fluidization rate and rheological behaviour of the failed mass). Finally, a quantitative hazard assessment is proposed by estimating the probability of reaching a certain location and a certain debris heights on the alluvial fan. The modelling exercise allows as well to define the efficiency of a large sediment trap that has been constructed below the landslide to protect some houses.