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## Integrated numerical modeling of a large debris flow in the Meilong catchment, China

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On June 17, 2020, a large debris flow occurred in the Meilong catchment following a short-duration, high-intensity rainstorm. The debris flow was initiated by two shallow landslides upstream of the catchment and had a volume of approximately  $7.7 \times 10^5 \text{ m}^3$ . It blocked the river and then induced flooding, which caused a great loss to the local residents. Through a combination of field observation, image interpretation and laboratory experiments, the initiation mechanism, erosion depth along the main channel and deposition area of this debris flow were comprehensively analyzed. A sequentially integrated numerical model considering the vegetation interception, infiltration and runoff process was developed. Considering the spatial variations in the climatic, hydrological and geotechnical parameters, the whole process of debris flow initiation, motion, entrainment and deposition were simulated. The computational outcomes matched well with the field observation results. A combination of the proposed integrated model and spatially varying parameters can be used to effectively describe the debris flow characteristics in the initiation and propagation stages and provide significant insights into physical processes involved in such hazards.