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Visual observation of erosion processes on the Black Marls badlands in the Southern Alps, France

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In order to clarify the erosion processes on a marly bare slope in the Southern Alps, the erosion processes in a steep and erodible slope composed of the Black Marls formation were observed by a time-lapse video camera. The observations revealed that miniature debris flows (MDFs) occurred at the time of the rainfall-runoff event in which the most severe erosion took place in the whole observation period of three months. Analyzing the camera images, the authors showed some characteristics of the MDFs and discussed them in the context of real rainfall-runoff phenomena observed at the outlet of the small experimental basin including the visually observed slope. The following results were obtained. 1) It is roughly estimated that the total amount of sediment discharge by the MDFs was not quantitatively negligible in the total sediment discharge from the entire experimental basin. 2) The MDFs occurred only during the rising limb of the hydrograph during 6 minutes. Since it is considered that the MDFs could transport coarser materials than the normal sediment-laden flow, it is inferred that the grain size distribution of the discharged sediment would temporarily fluctuate greatly. 3) The sediment concentration of the MDFs observed might be largely different from each other. Based on this observation and a review of the literature, in a very steep and highly erodible slope, MDFs or similar phenomena might play an important role in the erosion and transport processes. It is important to consider this possibility when examining the erosion models from a catchment composed of steep and erodible slopes.