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Erosion Dynamics and Stability Analysis in a small Alpine Watershed: The Case of the Courset River

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A superficial landslide of around 20'000 m3 occurred on the 26 August 2005 on the Courset watershed. This watershed is located in the Rhone Valley, at the front of the Alpine Helvetic nappes, in the canton of Vaud (West Switzerland). Field observations shows evidence of old movements and erosion processes and help to understand the landslide failure mechanism: water provided by precipitation infiltrates but is confined by flysch layers located one to two meters deep. Water creates a layer between the soil and the rock that permits soil sliding on the surface of the bedrock. This particular event raised questions on the general stability of the zone.
The aim of this study is to find out if the watershed will become a zone of intense erosion. To answer this question, various factors and tools are studied in particular erosion processes and slope stability. At first, the equilibrium profile of the Courset is determined to locate the most susceptible zones to erosion and the SLBL (sloping local base level) is used to determine the potential erosion volumes. Then, a classical slope stability analysis is performed, including laboratory tests to constraint geotechnical and hydrological parameters. The Sinmap method is used and compared with a new model developed to better characterize the hydrology. Precipitation data are also analyzed to better understand the trigger of landslide by rain, with a focus on the August 2005 precipitations.