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The role of subsurface topography and its implications on the water regime in the Urseren Valley, Switzerland

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To improve the understanding and the modelling of soil water regimes in alpine areas it is essential to know not only the number and the properties of the soil layers, but also their spatial distribution. One common assumption used in many simulations in the literature is that that the soil layers and the bedrock are parallel to the surface, which sometimes diverges significantly from the reality. A field campaign was conducted in the Urseren Valley, which lies in the heart of the Swiss Central Alps. This region is very susceptible to infiltration-triggered shallow landslides and for this reason a realistic simulation of soil water regime is crucial to predict soil slip occurrences. The primary method used for the determination of subsurface topography is the Ground Penetrating Radar at 100MHz and 250 MHz frequency. A 2D processing and analysis was carried out on the data collected form the field. Additional trenches were dug up at strategically important points to verify the soil stratigraphy obtain from the GPR analysis. Furthermore, soil samples were collected and tested in order to obtain some soil properties of the soil layers composing the profiles. These were used in a model based on Cellular Automata for the simulation of unsaturated and saturated flow. Simulations were run using representative rainfall events as recorded at the neighboring station of Andermatt. The results reveal clearly the importance of the detailed knowledge of the subsurface topography in such types of simulations.