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When does near-surface flow occur in a pre-Alpine headwater catchment?

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Overland and subsurface flow are major runoff processes but remain poorly understood for pre-Alpine catchments with low permeability soils. The connectivity of these near-surface flow pathways leads to quick changes in streamflow during events. However, their occurrence is highly variable in both space and time, and depends on the geomorphological setting and event characteristics. Therefore, the aim of the TopFlow project is to investigate the generation and connectivity of overland flow and shallow subsurface flow in a Swiss pre-Alpine catchment.

We installed runoff plots at 14 locations inside a 20-ha catchment to measure overland flow and shallow (up to ~40 cm) subsurface flow during two summers: 2021 and 2022. In addition, we used homemade electrical resistance sensors to detect near-surface flow and saturation and we measured groundwater levels and soil moisture. The plots are located at different topographic locations and under different vegetation. In this presentation, we will present our first results on the occurrence of the overland flow and shallow subsurface flow and relate them to the topographic position and rainfall- and antecedent wetness conditions.