



## **Sensitivity of runoff behaviour of Alpine catchments to system conditions – looking at the current and future situation**

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Alpine settlements are often situated on alluvial fans at the outlet of small catchments. Thus they are - due to the short response time - exposed to a high risk in case of flash floods. Within the project "Sensitivity of the runoff characteristics of small Alpine catchments to climate change" we aim at identifying the critical combinations of event characteristics (intensity and duration of rain) and system conditions (soil moisture, state of vegetation and land use, snow cover) producing flash floods in order to improve the predictability of such events.

We have investigated three Alpine catchments in western Austria with different altitudes and precipitation regimes. On the plot scale, field measurements, especially irrigation experiments, revealed that the rainfall-runoff reaction of slopes producing a high or low amount of surface runoff is relatively independent of the actual soil moisture content. However, plots producing a medium amount of surface runoff at dry conditions may generate significantly increased surface runoff volumes at moist conditions. Intensive grazing raises the amount of surface runoff with the duration of pasture season.

Event analysis and mapping of the catchment inventories showed that the catchments with low (Ruggbachtal, 400 - 1000 m a.s.l., Vorarlberg) and medium altitude (Brixenbachtal, 800 - 2000 m a.s.l., Tyrol) tend to be sensitive to antecedent precipitation. Due to the high amount of pastured areas, the Brixenbach catchment shows a seasonal variation of runoff behaviour with a maximum of surface runoff in the late summer. The highly situated catchment (Längental, 2000 - 3000 m a.s.l., Tyrol) may show an increased runoff response at rain-on-snow-events. Because of its high portion of rock and talus slopes the runoff reaction of the catchment is quite insensitive to antecedent soil moisture content and grazing intensity.

Currently ongoing hydrological modelling will show how seasonal system conditions (duration of snow cover, development of soil moisture) may change in the next decades. In a next step different precipitation events will be modelled at different system conditions. The combination of the results of the completed field measurements and the ongoing modelling will then show the critical combinations of event characteristics and system conditions producing flash floods and their future occurrence probability.