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The role of nowcasting products and meteorological data for improving debris flow prediction

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Gravitational natural hazards in mountain areas threaten settlements, infrastructure and traffic routes throughout the year. Although avalanches and debris flows have similar characteristics, there are major differences concerning prediction, i. e. especially the lead time of warning. Early warning systems for debris flows often combine precipitation forecasts with real-time local rainfall measurements based on empirically derived site-specific precipitation thresholds. Studies on numerous debris flow events shows that rainfall intensity and temperature are key variables while the quality of precipitation forecasts is of pivotal importance for the reliability of debris flow prediction.

Depending on the local conditions in a certain catchment area, local debris flow predictions based on certain key factors are possible and can be achieved by using decision trees and by setting alert levels. However, those predictions are still subject to substantial uncertainty. Automatic forecasts – either local for small catchment areas or regional for several catchments - are even much more difficult to implement. This is primarily due to the high spatial and temporal variability of key factors like e. g. the precipitation intensity, the availability of debris, or the antecedent precipitation.

We investigate how nowcasting products and data from weather stations in combination with the actual geomorphologic conditions in the catchment area can simplify and improve predictions of debris flows in central alpine areas. We present first preliminary results and propose requirements, which are fundamental for a reliable and sound debris flow prediction.