



Flash floods in small Alpine catchments in a changing climate

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Climate change is expected to increase the frequency and intensity of hazardous meteorological and hydrological events in numerous mountainous areas. The mountain environment is becoming more and more important for urbanization and the tourism-based economy. Here we show new and innovative methodologies for assessing intensity and frequency of flash floods in small Alpine catchments, in South Tyrol (Italy), under climate change. This research is done within the STEEP STREAMS project, whereby we work closely with decision makers in Italian authorities, and the final goal is to provide them with clear guidelines on how to adapt current structural solutions for mitigating hazardous events under future climate conditions. To this end, we develop a coupled framework of weather generation (i.e. extrapolation of observations and trained with climate projections), time series disaggregation and hydrological modelling using the conceptual HBV model. One of the key challenges is the transfer of comparatively coarse RCM projections to small catchments, whose sizes range from only about 10km² to 100km². We examine different strategies to downscale the RCM data from e.g. the EURO-CORDEX dataset using our weather generator. The selected projections represent combinations of warmer, milder, drier and wetter conditions. In general, our main focus is to develop an improved understanding of the impact of the multiple sources of uncertainty in this modelling framework, and make these uncertainties tangible. The output of this study (i.e. discharge with a return period and associated uncertainty) will allow hydraulic and sediment transport modelling of flash floods and debris flows.