



## Climate change effects on runoff in the Ötztal glacierized catchments

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Future climate change is expected to alter the runoff characteristics of glacierized catchments, which is expected to have consequences for the water availability in these catchments. For this reason it is important to understand and to assess the impact of climate change on the hydrology of glacierized catchments.

In this study, the hydrological response of glacierized catchments to future climate change is investigated in the Ötztal Alps, Austria. For this purpose, two conceptual hydrological models, HBV and HQsim, were applied for the simulation of future daily discharge in three (nested) catchments with different degrees of glaciation. The models were forced with a combination of downscaled climate scenarios and glacier scenarios. For downscaled climate scenarios, projections of daily temperature and precipitation for the period 1985-2100 were used that were derived from three combinations of general circulation models (GCMs) and regional climate models (RCMs). These projections were subsequently used in a delta change approach. Daily anomalies of temperature and precipitation were calculated for (i) 2010-2039, (ii) 2040-2069, and (iii) 2070-2099, on the basis of the original meteorological data series of 1983-2012. A one-way coupling scheme with an empirical glacier model, able to simulate future glacial evolution as a result of climate change, was used to force the models with glacier scenarios. Subsequently, the outcomes of the hydrological models are used to analyse changes in the seasonality of high runoff conditions, absolute and relative changes, the seasonality of annual flood peaks, and low flow characteristics.

Under the future conditions the outcomes show initially runoff increases for all catchments without changes in the runoff regimes. On the long-term, summer runoff is expected to decrease and winter/spring runoff is expected to increase in all catchments. These runoff changes are accompanied with regime shifts from glacial/glacio-nival runoff regimes to runoff regimes with a higher nival component. Changing runoff conditions might also lead to changes in the seasonality of annual flood peaks with an earlier appearance of flood peaks through the year, and an increasing abundance of low flow conditions during summer months. The results of this study help to have a better understanding of the future impact of climate change on the water cycle of glacierized catchments.