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The influence of glaciers on stream water temperature - a statistical comparison of different glaciated catchments in the Sonnblick - Region (Austria)

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The intention of this study is to investigate the relationship between climatological and hydrological variables and the water temperature to approve finally their special behaviours in glacial catchments.
The study was performed on the north-east slope of Sonnblick (Hohe Tauern, Austria) based on two nested glacial catchments, with Goldbergkees ($1.4 km^2$) as major input, and a third one without glacial influence. During August and September 2004 water temperature measurements were investigated. Daily values of climatological (air temperature, short wave radiation) and hydrological data (glacial discharge and modelled snow and ice melt runoff (PREVAH)) were used to quantify the influence of their forcings on water temperature. Correlation- and partial correlation coefficients were computed to determine the relationship between the water temperature and the climatological and hydrological variables.
The glacial stream showed a significant lower water temperature compared to the non-glaciated one. Moreover, water temperature increases with decreasing glaciation in the catchment. Decreasing glaciation results also in an increase of range and variance of the water temperature. Using linear correlation- and regressiontechniques on a daily basis statistical modells were customized to predict water temperature using climatological and hydrological variables. With this approach 72% of water temperature can be estimated for the 14% glaciated catchment, 50% for the 55% glaciated catchment.