



Sensing runoff sensitivity of snow covered area influenced by vertical discretisation of a hydrological model

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Snow represents an important component of the hydrological cycle. Especially for mountain regions snow is an important function both of bargeboard and for affecting flood events in spring and the early summer. Hence the estimation of the snowcover is - next to water management - a considerable factor for rainfall-runoff modelling used for flood forecasting in alpine catchments. Therefore snow cover data supply a vital basis for calibrating conceptual hydrological models.

This study investigates the runoff sensitivities on snow covered area of the semi-distributed water balance model HQsim. Therefore the snow relevant parameters of the HQsim model are varied in frame of a uniform distributed Monte Carlo simulation (MC). Since the model is based on hydrological response units (HRU), the impact of the variability of the HRUs regarding vertical zoning is tested. Two alpine catchments were used to test a zoning of 250 m and 500 m steps. Totally 5,000 parameter settings (within physically meaningfull boundaries) were generated for running HQsim on both vertical discretisations. The simulated snow covered area was compared with MODIS-data for melting periods during the the years 2003-2011. The results were evaluated by different skill measures based on a contingency table. To get the elitist parameter settings the pareto optimalities for each skill measurement were detected. Finally the runoff variability within the MC and their pareto optimalities were analysed on an (a) event basis and (b) on a long term basis using the period of 2000-2010. Finally this work shows i) the sensitivity of the runoff with regard to the quality of the modelled snow covered area and ii) the effect of vertical discretisation on the runoff variability based on snow covered area.