Modelled seasonal forecasts of snow water equivalent and runoff in alpine catchments

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Seasonal forecasts of water balance components are becoming increasingly important for hydrological applications. These forecasts are typically derived from coupled atmosphere-ocean climate models, which enable physically based seasonal forecasts. In mountainous regions, however, topography is complex whilst typical spatial resolutions of the climate models are still comparably coarse, i.e in the data, ridges and valleys are not represented with sufficient accuracy. Therefore, seasonal predictions of atmospheric variables require consideration of representative gradients.

We present first results of seasonal forecasts and re-forecasts processed by the NCEP (National Centers for Environmental Prediction) Climate Forecast System version 2 (CFSv2). These are prepared for monthly time steps in order to be used for ensemble runs of water balance simulation using the Alpine Water balance And Runoff Estimation model (AWARE). This model has been designed for monthly seasonal predictions in ice- and snowmelt dominated catchments. The study area is the Inn catchment in Tyrol/Austria, including its headwaters in Switzerland.

Results are evaluated for both anomalies of meteorological input data (temperature and precipitation), as well as balance components including snow water equivalent and runoff, both simulated with AWARE. Based on model skill evaluations derived from forecasts and observations, the model chain CFSv2 – AWARE proves helpful to analyse possible future hydrological system states of mountainous catchments with emphasis on spatio-temporal snow cover evolution.