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Change of hydrological response due to climate change scenarios for the Lainsitz river basin in Austria

H. Holzmann, H. Formayer, Th. Lehmann

Department of Water, Atmosphere and Environment. University of Natural Resources and Applied Life Sciences, Vienna.

(hubert.holzmann@boku.ac.at)

Climate change is nowadays described by global and regional meteorological models. They enable the estimation of the change of the meteorological driving forces like rainfall and air temperature. Within a research project the German LAM – nested in the ECHAM5/MPI-OM global circulation model - developed by REMO-UBA was applied to identify the meteorological changes for the Lainsitz basin. The basins area is 270 km2 and its elevation ranges from 400 to 1100 m a. sl. Due to the small size of the basin the hydrological response to climate driving forces is quite rapid. Therefore the original REMO-UBA data were temporally downscaled to daily time discretisation using a statistical weather generator function (LARS-WG). Based on these meteorological tools time series scenarios with the length of 200 years were generated. The status quo situation was described by the normal period 1961 – 1990. Furthermore two scenarios (optimistic B1 and realistic A1B) were generated, representing the conditions of the period 2070 to 2100. Temperature and precipitation of the three scenarios formed the input for a hydrological model. This model is based on a multiple storage concept considering soil interception, actual evapotranspiration, quick (surface flow), mediate (interflow) and slow (base flow) runoff components. Snow accumulation and melt is computed by day degree method by means of elevation band distribution. The variables of interest and their response to climate change were maximum, mean and minimum discharge, low flow duration, stress periods due to soil moisture limitation and snow data (snow depth, duration of snow cover and snow melt contribution). The analysis was done by monthly statistics, flood frequency analysis were based on the

annual maxima of the scenario time series. Furthermore a flood generation classification scheme was applied to detect changes in flood formation. Scenario B1 exhibits an increase of the maxima, mean and minimum discharges, where scenario A1B showed a decrease compared with the status quo situation. This is predominantly the case in the late summer and autumn period where also low flow periods are more likely. Snow accumulation and the length of snow covered periods decrease with both scenarios, where A1B shows a more significant reduction. In the presentation also some critical review of the climate change results and the reliability of the hydrological model will be given.