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Water balance modeling under data sparse conditions using globally available data

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Unavailability of required data for modelling has lead to the IAHS PUB initiative focusing on hydrological modelling in areas with few available data or data in lower resolution. Coping with limited or very scarce available data is a prerequisite to making better predictions in ungauged basins. This study presents water balance modelling for meso-scale catchments using globally available data. The study is carried out for the Chirchik basin in Central Asia where very limited coarse data is available and the Neckar basin in Germany with high density data served as test area. For both catchments, globally available data such as NCEP reanalysis and GPCC are used and locally available observed data in the Neckar basin is used to test the model performance. Disaggregation of global data both spatially and temporally is carried out to get finer resolution input data which is needed for better predictions in ungauged basin. HBV-IWS, a semi-distributed hydrological model was adapted to allow for the estimation of glacier melt in the Chirchik basin with elevations exceeding 4000 m.a.s.l. Input data is prepared in daily resolution for model calibration. The model is run on a daily basis but compared against monthly discharges since only monthly observed data was available. Obtained results give a better understanding of process conceptualisation under heterogeneous climatic and landscape condition. Performance of the model increases with the landscape and climate heterogeneity reduction. Comparison of monthly discharges and daily duration curves in the Neckar basin support the disaggregation methods used for input data refinement. For the Chirchik basin, an additional rainfall distribution method is used and the results show the possibility of water balance modelling using globally available data for better prediction under ungauged conditions. The flow duration curve comparisons of monthly discharges in the Chirchik basin suggest the possibility of predicting useful daily discharge distributions

for water resources management in “ungauged” basin.