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Evaluation of the precipitation input for hydrological modeling of a mountainous catchment in Kyrgyzstan

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Changes in discharge in the mountainous upstream basins in Kyrgyzstan and Tajikistan are of great relevance for Central Asia, which highly depends on water for irrigation and hydropower generation. It is therefore of great interest to set up hydrological models in order to assess, in combination with climate model output, the potential impacts of climate change on water resources. Central Asia is however also a data sparse region and in particular the generation of suitable precipitation input fields is a challenge, as the number of stations is low and at the same time the spatial variability is high due to the complex terrain. We suggest that in such cases different approaches for the precipitation input should be assessed, and that modelled precipitation can sometimes be a more suitable input than measured precipitation.
In this study the hydrological model WASA is applied to the Karadarya basin (12000 km^2), located in the Tien Shan Mountains in Kyrgyzstan. We compare precipitation input data sets from multi-linear regression of station data and ERA-40 data downscaled with the regional climate model WRF to a resolution of 12 km. The advantage of using the ERA-40 driven RCM output is that the wind field is known to the RCM and thus windward/leeward effects are represented in a more suitable way than in the linear regression approach, the RCM output is however often biased. The hydrological model is automatically calibrated to observed discharge using the different precipitation inputs. We show results for the performance of downscaled ERA-40 data against observed station data at the station locations. Ultimately the different precipitation data sets are evaluated by the goodness of fit of the simulated against the observed discharge.