

NUMERICAL DOWNSCALING OF THE ERA-40 REANALYSIS OVER THE CENTRAL ASIAN TOPOGRAPHY

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Abstract: Model-assimilated precipitation data can complement or substitute conventional station data in hydrological applications. This is especially relevant in mountainous and data-sparse regions such as Central Asia, where the number of meteorological stations and snow depth observations has decreased considerably after the disintegration of the Soviet Union. Previously, we have applied the ERA-15 and ERA-40 reanalysis datasets for seasonal river runoff forecasting in the cases of Syrdarya and Amudarya, the major Central Asian rivers. While this approach has proven to be successful in general (as the summer runoff of these rivers mainly derives from the melt of snow from the preceding winter and spring season), the quality of runoff forecasts depends strongly on the characteristics of the catchments under consideration, and is limited by the low spatial resolution and limited temporal homogeneity of reanalysis datasets. In this study, we apply a regional climate model (Climate High Resolution Model, CHRM) in order to downscale the ERA-40 reanalysis dataset. Downscaling allows for a better representation of the complex topography of Central Asia on the precipitation distribution. We validate the CHRM output by comparison against reanalysis (NCEP, ERA-40) and gridded gauge data (CRU-2.1) on monthly and seasonal timescales, and against single station data on weather timescales. The application of the downscaled precipitation data sets to seasonal runoff forecasting in Central Asia is also discussed.