Evaluating satellite-based rainfall estimates to support low flow modelling in data scarce Andean catchments at different latitudes of Chile

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Drought management and the equitable allocation of water depend on long term and seasonal discharge predictions based on reliable rainfall-runoff models. However, this is challenging in mountainous catchments as these are usually data scarce particularly lacking of hydro-meteorological data at higher altitudes needed for modelling.
Complementary to our previous studies evaluating point to pixel performance of different satellite based precipitation products along the latitudinal Chilean gradient and modelling Andean catchments with in-situ data, we here first evaluated the performance of different SRE products in modelling one headwater catchment with SWAT and HBV light and then applied the best performing product CHIRPSv2.0 to TUWmodel for catchments in different geographical settings. We used R package hydroPSO and SOBOL for calibration and the objective functions logNSE and KGE to obtain the best parameter sets to simulate discharge within an uncertainty band. Best results were obtained by the models forced with the CHIRPSv2.0 data followed by MSWEPv2.0 and TMPA 3B42v7 datasets. Overall, modelling showed better results forced with SRE products (>0.7 logNSE and KGE) compared to measured data.
After a thorough evaluation of available tools, we believe that the combination of data sets, R packages and models used in this study represent a valuable instrument for drought management in data scarce regions. It relies on open source data, scripts and models which are well documented and require little computation time.