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Optimization of precipitation inputs for SWAT modeling in mountainous catchment

Ye Tuo, Gabriele Chiogna, and Markus Disse
Chair of Hydrology and River Basin Management, Technische Universität München,Munich,Germany (ye.tuo@tum.de)

Precipitation is often the most important input data in hydrological models when simulating streamflow in mountainous catchment. The Soil and Water Assessment Tool (SWAT), a widely used hydrological model, only makes use of data from one precipitation gauging station which is nearest to the centroid of each subcatchment, eventually corrected using the band elevation method. This leads in general to inaccurate subcatchment precipitation representation, which results in unreliable simulation results in mountainous catchment. To investigate the impact of the precipitation inputs and consider the high spatial and temporal variability of precipitation, we first interpolated 21 years (1990-2010) of daily measured data using the Inverse Distance Weighting (IDW) method. Averaged IDW daily values have been calculated at the subcatchment scale to be further supplied as optimized precipitation inputs for SWAT. Both datasets (Measured data and IDW data) are applied to three Alpine subcatchments of the Adige catchment (North-eastern Italy, 12100 km^2) as precipitation inputs. Based on the calibration and validation results, model performances are evaluated according to the Nash Sutchliffe Efficiency (NSE) and Coefficient of Determination (R^2). For all three subcatchments, the simulation results with IDW inputs are better than the original method which uses measured inputs from the nearest station. This suggests that IDW method could improve the model performance in Alpine catchments to some extent. By taking into account and weighting the distance between precipitation records, IDW supplies more accurate precipitation inputs for each individual Alpine subcatchment, which would as a whole lead to an improved description of the hydrological behavior of the entire Adige catchment.