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# Comparison and hydrological modeling of spatial interpolation schemes for rainfall data

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Abstract: Watershed management, disaster prediction and hydrological modeling require data related to very important mater of spatial distribution information of precipitation. However, different interpolation methods in the same catchment may result in large differences and hence in deviations from the actual spatial distribution of rainfall. In our study, the meso-scale catchment of the Fuhe River in the southeastern of China was chosen as the study region, and the principal component regression Model between observed precipitation and site geographic information by adding the elevation, slope and aspect as covariate. The residual value which obtained by subtracting the simulated value from the observed value was interpolated by inverse distance square method (IDSW), and was ultimately added to the regression raster to draw the final result. This method was named as the principal component regression-residual analysis (PCRR) method. The annual precipitation interpolation was calculated by using PCRR method and other traditional interpolation methods including (1)inverse distance interpolation (IDW), (2) ordinary Kriging (OK), (3) Co Kriging (CK), (4) global polynomial interpolation (GP), (5) local polynomial interpolation (LP), (6) radial basis function (RBF) and (7) multiple linear regression (MLR). And PCRR, IDW, and MLR was used to interpolate daily precipitation. The methods mentioned above was assessed by using cross-validation approach to evaluate the capability to reproduce measured data. A hydrologic model (HEC-HMS) was used to calculate runoff and compare modeled to measured runoff in daily time step by using PCRR,IDSW and MLR method as input separately. By this assessment, the PCRR methods showed the best performance, which could effectively eliminate the interpolation anomalies caused by terrain difference between observation points and surrounding areas, and could eliminate the smoothing effect. The simulated stream flows showed different characteristics in mean, maximum, minimum, and peak flows, and the PCRR simulation result showed the least streamflow error and good correlationship with the measured process.