Abstract

Accurate estimation of point rainfall at ungauged locations from the measurements at surrounding sites is critical in obtaining a continuous surface of rainfall information. This can be accomplished through numerous interpolation methods, which have different strengths and weaknesses. The accuracy of the resulting continuous surface of rainfall information depends on the density of the point data and observational errors, which in turn affect the integrity of hydrological studies that utilize the data as input. In this study, four interpolation methods—Thiessen polygon, inverse distance weighting (IDW), thin plate, and Kriging—were evaluated at an experimental catchment in South West England at three gauge densities through the leave-one-out cross-validation (LOOCV) method. The numbers of rain gauges used for the three densities were 49, 28, and 10, which were translated to 2.75, 4.82, and 13.5 km2 per gauge since the area of the catchment was 135.2 km2. The gauge density was found to have an effect on the accuracy of the interpolated results as there was a gradual improvement in the error statistic with a corresponding increase in the gauge density. The results also showed that IDW and Kriging were better than the Thiessen polygon and thin plate methods at all the three gauge densities. The performances of IDW and Kriging were similar, suggesting that Kriging, though complex in nature, does not show greater predictive ability than IDW. It is important to note that there is a significant difference in R2 between the cross-sectional approach and longitudinal approach.