

Precipitation pattern modeling using cross-station perception: regional investigation

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Abstract

Establishing robust models for predicting precipitation processes can yield a significant aspect for many applications in water resource engineering and environmental prospective. In particular, understanding precipitation phenomena is crucial for managing the effects of flooding in watersheds. In this research, a regional precipitation pattern modeling was undertaken using three intelligent predictive models incorporating artificial neural network (ANN), support vector machine (SVM) and random forest (RF) methods. The modeling was carried out using monthly time scale precipitation information in a semi arid environment located in Iraq. Twenty weather stations covering the entire region were used to construct the predictive models. At the initial stage, the region was divided into three climatic districts based on documented research. Initially, modeling was carried out for each district using historical information from regionally distributed meteorological stations for calibration. Subsequently, cross-station modeling was undertaken for each district using precipitation data from other districts. The study demonstrated that cross-station modeling was an effective means of predicting the spatial distribution of precipitation in watersheds with limited meteorological data.