

Investigate the effect of spatial variables on the weather radar adjustment method for heavy rainfall events by ANFIS-PSO

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Abstract

Adjusting weather radar data is a prerequisite for its use in various hydrological studies. Effect of spatial variables are considered to adjust weather radar data in many of these researches. The existence of diverse topography in South Korea has increased the importance of analyzing these variables. In this study, some spatial variable like slope, elevation, aspect, distance from the sea, plan and profile curvature was considered. To investigate different topographic conditions, tried to use three radar station of Gwanaksan, Gwangdeoksan and Gudeoksan which are located in northwest, north and southeast of South Korea, respectively. To form the suitable fuzzy model and create the best membership functions of variables, ANFIS-PSO model was applied. After optimizing the model, the correlation coefficient and sensitivity of adjusted Quantitative Precipitation Estimation (QPE) based on spatial variables was calculated to find how variables work in adjusted QPE process. The results showed that the variable of elevation causes the most change in rainfall and consequently in the adjustment of radar data in model. Accordingly, the sensitivity ratio calculated for variables shows that with increasing rainfall duration, the effects of these variables on rainfall adjustment increase. The approach of this study, due to the simplicity and accuracy of this method, can be used to adjust the weather radar data and other required models.

Keywords : Weather radar data, ANFIS-PSO, Spatial variables, South Korea

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