Forecasting Spring Rainfall Based on Teleconnection Synoptical Patterns Using Artificial Neural Networks

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This paper aims to study the relationship between climatic large-scale synoptic patterns and rainfall in Khorasan-e Razavi Province. Artificial neural networks were used in this study to predict rainfall in the period between April and June in the province. We first analyzed the relationship between average regional rainfall and the changes in synoptic patterns including sea-level pressure, sea-level pressure difference, sea-level temperature, temperature difference between sea level and 1000-mb level, the temperature of 700-mb level, the thickness between 500 and 1000-mb levels, the relative humidity of 300-mb level and precipitable water. In the selection of these regions, we have considered the effect of synoptic patterns in these regions on the rainfall in the northeast region of Iran. Then, artificial neural networks model for the period 1970-1997 were taught. Finally, the rainfall in the period 1998-2007 has been predicted. The results show that artificial neural networks can predict rainfall with reasonable accuracy in all years. The root mean-square error of the model was 2.5 millimeter.

Keywords: rainfall prediction, synoptic patterns, artificial neural networks