Drought forecasting over South Korea based on the teleconnected global climate variables

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Abstract

Drought occurs due to lack of water resources over an extended period and its intensity has been magnified globally by climate change. In recent years, drought over South Korea has also been intensed, and the prediction was inevitable for the water resource management and water industry. Therefore, drought forecasting over South Korea was performed in the current study with the following procedure. First, accumulated spring precipitation(ASP) driven by the 93 weather stations in South Korea was taken with their median. Then, correlation analysis was followed between ASP and Df4m, the differences of two pair of the global winter MSLP. The 37 Df4m variables with high correlations over 0.55 was chosen and sorted into three regions. The selected Df4m variables in the same region showed high similarity, leading the multicollinearity problem. To avoid this problem, a model that performs variable selection and model fitting at once, least absolute shrinkage and selection operator(LASSO) was applied. The LASSO model selected 5 variables which showed a good agreement of the predicted with the observed value, R^2=0.72. Other models such as multiple linear regression model and ElasticNet were also performed, but did not present a performance as good as LASSO. Therefore, LASSO model can be an appropriate model to forecast spring drought over South Korea and can be used to mange water resources efficiently.

Keywords : Spring Drought, MSLP, Variable Selection, LASSO, Climate Teleconnection

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