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A Study for Drought Characteristics Using EOF of SPI

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Drought characteristics provide critical information to decide adequate policy for reducing drought damage and water resource management. This study introduces a method to evaluate the probability of a specific area to be affected by a drought of a given severity and shows its potential for investigating agricultural drought characteristics.

The method is applied to South Korea as a case study. The proposed procedure includes Standard Precipitation Index (SPI) time series, which are linearly transformed by the Empirical Orthogonal Functions(EOF) method. These EOFs are extended temporally with AutoRegressive Moving Average (ARMA) method and spatially South Korea was divided into 10,000 grid-cells of 5.5×6.0 km by Kriging method. By performing these simulations, long time series of SPI can be simulated for each designed grid cell in whole South Korea area. The probability distribution functions of the area covered by a drought and the drought severity are then derived and combined to produce drought severity-area-frequency (SAF) curves. It showed that the worst drought event which was happened 2001 was over 10 years return period and 50% of area was under extreme drought (SPI -2.0).

The results indicated in this paper can be utilized for reducing drought damage though predicting of drought damage scale with SAF curve.

Keywords: Drought; SPI; EOF; Severity-area-frequency curve; South Korea

References

[1] de Marsily, G., *Quantitative Hydrogeology, Academic Press (1986).*
[2] George H. Dunteman, *Principal Components Analysis, Sage Pubs (1989).*