Drought: A comprehensive R package for drought monitoring, prediction and analysis

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Drought may impose serious challenges to human societies and ecosystems. Due to complicated causing effects and wide impacts, a universally accepted definition of drought does not exist. The drought indicator is commonly used to characterize drought properties such as duration or severity. Various drought indicators have been developed in the past few decades for the monitoring of a certain aspect of drought condition along with the development of multivariate drought indices for drought characterizations from multiple sources or hydro-climatic variables. Reliable drought prediction with suitable drought indicators is critical to the drought preparedness plan to reduce potential drought impacts. In addition, drought analysis to quantify the risk of drought properties would provide useful information for operation drought managements. The drought monitoring, prediction and risk analysis are important components in drought modeling and assessments.

In this study, a comprehensive R package "drought" is developed to aid the drought monitoring, prediction and risk analysis (available from R-Forge and CRAN soon). The computation of a suite of univariate and multivariate drought indices that integrate drought information from various sources such as precipitation, temperature, soil moisture, and runoff is available in the drought monitoring component in the package. The drought prediction/forecasting component consists of statistical drought predictions to enhance the drought early warning for decision makings. Analysis of drought properties such as duration and severity is also provided in this package for drought risk assessments. Based on this package, a drought monitoring and prediction/forecasting system is under development as a decision supporting tool. The package will be provided freely to the public to aid the drought modeling and assessment for researchers and practitioners.