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Data Article

Description of future drought indices in Virginia



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ARTICLE INFO

Article history:

Received 23 June 2017

Accepted 18 July 2017

Available online 20 July 2017

Keywords:

Drought
Modeling
Climate change
Virginia
USA

ABSTRACT

This article presents projected future drought occurrences in five river basins in Virginia. The Soil and Water Assessment Tool (SWAT) and the Coupled Model Intercomparison Project Phase 5 (CMIP5) climate models were used to derive input variables of multiple drought indices, such as the Standardized Soil Moisture index (SSI), the Multivariate Standardized Drought Index (MSDI), and the Modified Palmer Drought Severity Index (MPDSI) for both historic and future periods. The results of SSI indicate that there was an overall increase in agricultural drought occurrences and that these were caused by increases in evapotranspiration and runoff. However, the results of the MSDI and MPDSI projected a decrease in drought occurrences in future periods due to a greater increase in precipitation in the future. Furthermore, GCM-downscaled products (precipitation and temperature) were verified using comparisons with historic observations, and the results of uncertainty analyses suggest that the lower and upper bounds of future drought projections agree with historic conditions.

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Specification Table

Subject area	Environmental Science
More specific subject area	Climate change impacts on drought occurrences

DOI of original article: <http://dx.doi.org/10.1016/j.ejrh.2017.06.003>

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<http://dx.doi.org/10.1016/j.dib.2017.07.042>

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Type of data	Figures and Tables
How data were acquired	Data were acquired using hydrological modeling with the Soil and Water Assessment Tool (SWAT) model and Coupled Model Intercomparison Project Phase 5 (CMIP5) climate scenarios
Data format	Analyzed
Data source location	Downscaled CMIP5 precipitation and temperature data was from http://gdo-dcp.ucllnl.org .
Experimental factors	R coding was used to compute multiple drought indices.
Experimental features	Standardized Soil Moisture index (SSI), Multivariate Standardized Drought Index (MSDI), and Modified Palmer Drought Severity Index (MPDSI) for both historic (his: 1970–1999) and future periods (f1: 2020–2049, f2: 2050–2079) were computed.
Data accessibility	The data are available in this article.

Data value

- Provides information about the spatio-temporal patterns of future drought occurrences and seasonal characteristics.
- Can be used to identify areas vulnerable to climate change and droughts.
- Can contribute significantly to research in the fields of drought risk management and drought mitigation strategies.

1. Data

1.1. Drought indices

The figures and tables in this article provide analyses of drought indices computed with the Soil and Water Assessment Tool [1] and Coupled Model Intercomparison Project Phase 5 (CMIP5) climate model [6]. Fig. 1 shows the location of five main river basins in Virginia; they are the James, New, Rappahannock, Roanoke, and York River basins. Additionally, Table 1 shows the CMIP5 climate models that were used in this article.

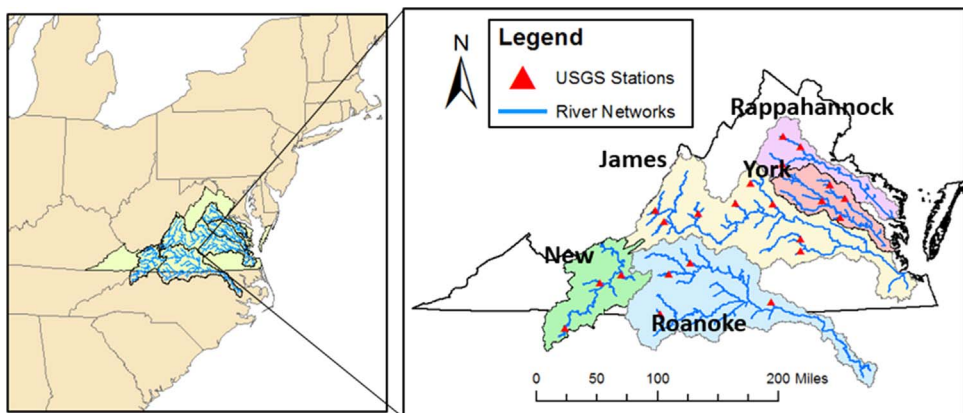


Fig. 1. Location map of the five river basins in Virginia. The red triangles represent the USGS stream gauge stations, and the blue lines represent the river networks.

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