

Postprint: Drought Characteristics in Henan Province from 2000 to 2016 Based on VSWI and SPI

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Abstract

Drought is a common and severe natural disaster that significantly impacts agricultural production in China. This study employs Henan Province as a case study, utilizing MODIS product vegetation index and land surface temperature data to construct vegetation supply water indices (VSWIN, VSWIE) that characterize regional drought features, and performs a comparative analysis with Standardized Precipitation Index (SPI) values at different time scales calculated from data of 16 national meteorological stations in Henan Province for the period 2000–2016. The results demonstrate that: VSWIE exhibits greater suitability than VSWIN for drought research in Henan Province; SPI values at 3-month and 12-month scales show high correlation with VSWI; temporally, Henan Province exhibits a high frequency of drought occurrence, with spring drought and summer drought frequencies of 0.33 and 0.30, respectively, and the overall drought trend becomes more pronounced, with the most severe spring drought occurring in 2000 and the most severe summer drought in 2014; spatially, drought conditions are more severe in northern and western Henan compared to southern Henan.

Full Text

Characteristics of Drought in Henan Province from 2000 to 2016 Based on VSWI and SPI

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Abstract: Drought is a common and severe natural disaster that seriously affects agricultural production in China. This study takes Henan Province as an example, using MODIS products MOD13Q1 to obtain vegetation indices (NDVI, EVI) and MODIS11A2 to obtain surface temperature (Ts) data to construct the Vegetation Supply Water Index (VSWIN, VSWIE) for indicating regional drought characteristics. These indices are then compared with the Standardized Precipitation Index (SPI) calculated from data at 16 national weather stations in Henan Province at different timescales from 2000 to 2016. The results show that VSWIE is more suitable than VSWIN for drought studies in Henan Province. The correlations between VSWI and SPI values at 3-month and 12-month scales are higher and more suitable for drought analysis in Henan. Temporally, drought frequency in Henan Province is high, with spring and summer drought frequencies of 0.33 and 0.30, respectively. The overall drought trend is increasingly evident. The most severe spring drought occurred in 2000, while the worst summer drought happened in 2014. Spatially, drought severity in northern and western Henan is more serious than in southern Henan. This study reveals the development characteristics of drought in Henan and provides valuable information for drought monitoring and early warning in the region.

Keywords: VSWI; SPI; drought monitoring; Henan Province

Note: Figure translations are in progress. See original paper for figures.

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