

Spatial-temporal drought characteristics in the Pearl River basin in the last 60 years based on the MCI of Penman-Monteith

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Abstract

The Pearl River Basin is prone to drought, and it is of great practical significance to use the comprehensive meteorological drought index to accurately assess its spatial and temporal variability. Based on the daily MCI values of 75 meteorological stations in the Pearl River Basin from 1961 to 2020, the spatial and temporal evolution characteristics of drought days, drought station ratio, drought impact range, and cumulative drought intensity are analyzed by using Kriging spatial interpolation, linear trend analysis, Mann-Kendall mutation test and empirical orthogonal function (EOF). The results show that the distribution of drought days generally shows a decreasing trend from the middle of the basin to the east and west, and areawide and local droughts are prone to occur. Drought days are highest in winter, followed by spring and autumn, and lowest in summer. Spatially, the distribution is more west than east in spring and winter, less west than east in autumn, and very few drought days in summer throughout the basin. The cumulative drought intensity is close to the same trend as the drought impact, showing a positive correlation. The first mode of cumulative drought intensity's EOF expansion reflects consistent basin-wide drought variation, while the second mode reflects the spatial distribution characteristics of the inverse phase variation in the western and eastern parts of the basin.

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