Using an Evapotranspiration-based Drought Index

Estimating Drought Conditions across the United States

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Correlation coefficient
Precipitation (mm/month)

0.3
0.4
0.5
0.6
0.7
0.8

20
40
60
80
100
120

(a)

(b)

CA NV UT TX WI MI IN
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

(a)

(b)

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Method and Data

II. Method and Data

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Introduction

I. Introduction

The ET index is a widely used drought index, but its effectiveness in estimating drought conditions across the United States has not been well documented. This study compared the ET index with other drought indices and found that it performed well in estimating drought conditions in the western United States, where evapotranspiration is a significant factor in water balance. However, the ET index may not be as effective in areas with limited evapotranspiration, such as the eastern United States, where other indices may provide a more accurate assessment of drought conditions.

The ET index is calculated as the difference between potential evapotranspiration (PET) and actual evapotranspiration (ET) over a given period. PET is the maximum amount of water that could be evaporated and transpired from a surface under the prevailing climatic conditions, while ET is the amount of water that is actually evaporated and transpired. The ET index can be expressed as:

\[ ET = PET - ET \]

where ET is the evapotranspiration index, PET is the potential evapotranspiration, and ET is the actual evapotranspiration.

The ET index is affected by several factors, including temperature, humidity, wind speed, and solar radiation. These factors can be estimated from climatic data, which are typically available from weather stations.

In this study, the ET index was calculated using data from 14 weather stations across the western United States for the period from 2000 to 2012. The results showed that the ET index was able to capture the seasonal variation in drought conditions, with the highest values occurring during the summer months in the western United States, where evapotranspiration is at its peak.

The results of this study suggest that the ET index can be a useful tool for estimating drought conditions in the western United States, where evapotranspiration is a significant factor in water balance. However, further research is needed to evaluate the effectiveness of the ET index in other regions, where other factors may play a more significant role in determining drought conditions.

References


