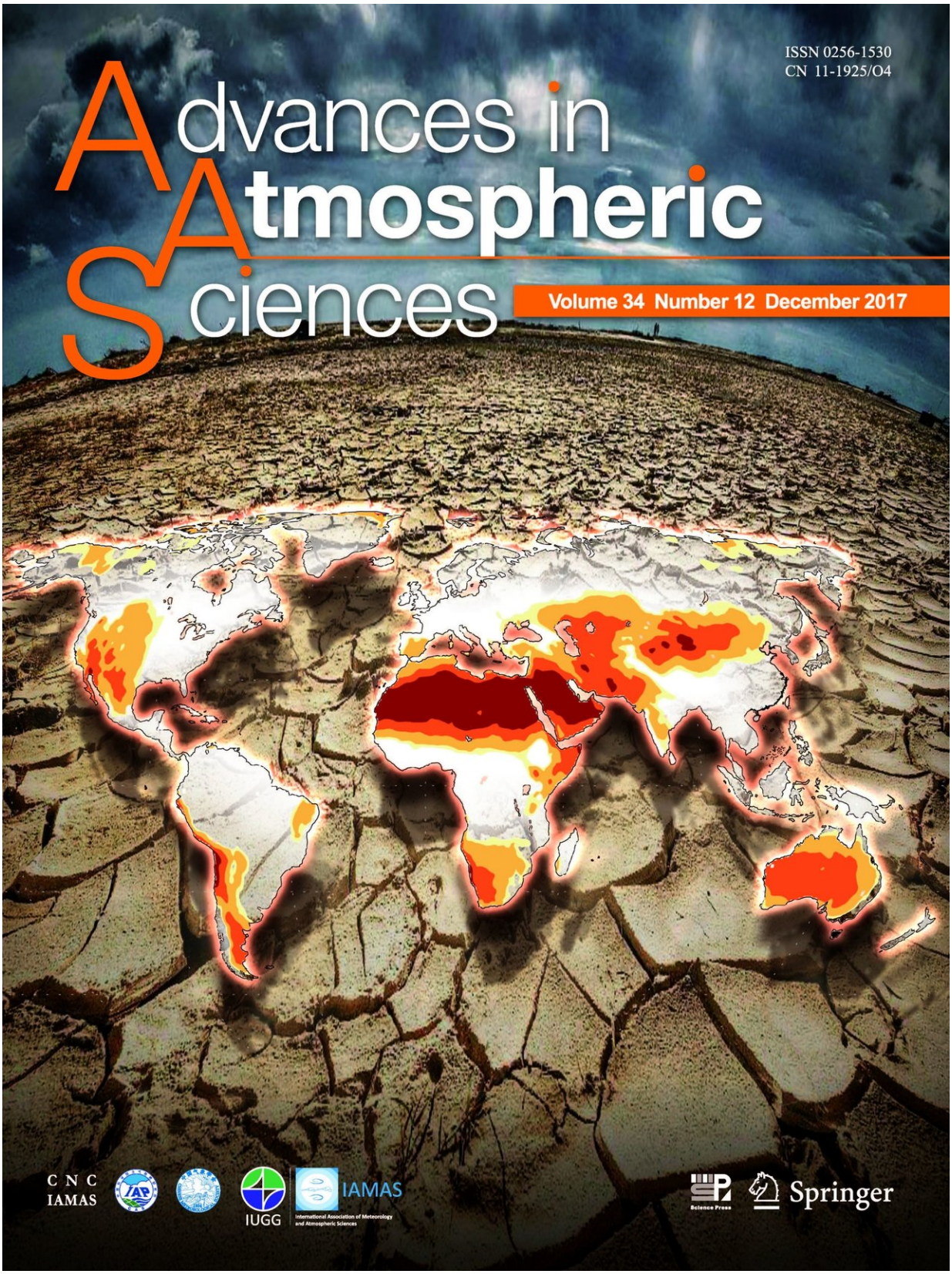
Finding the best drought index to study global drylands

November 10 2017


ISSN 0256-1530
CN 11-1925/O4
Advances in Atmospheric Sciences
Volume 34 Number 12 December 2017
CNC
IAMAS
IUGG
IAMAS
International Association of Meteorology and Atmospheric Sciences
Science Press
Springer

Drylands are among those regions most sensitive to climate and environmental changes and human-induced perturbations. The cover image shows spatial distribution of global drylands defined by the Surface Wetness Index below 0.65. Credit: *Advances in Atmospheric Sciences*

Drought is the world's costliest type of natural disaster. To monitor, detect and quantify drought, many drought indices have been developed. Previous studies have shown that different indices can yield diverse results for a specific drought event, and a drought index can also give different results depending on the method used for the calculation of potential evapotranspiration (PET).

For instance, the Surface Wetness Index (SWI) is a ratio of annual precipitation to PET, which is the most widely accepted index used to define drylands. It does not feature any parametrization, standardization or post-processing, and is therefore affected by different estimates of PET. However, the sensitivity of the SWI to different methods for calculating PET has yet to be investigated in the context of the spatial distribution and temporal evolution of global drylands.

In a new study published in *Advances in Atmospheric Sciences*, scientists from the Institute of Atmospheric Physics, Chinese Academy of Sciences, compared the spatiotemporal characteristics of global drylands based on the SWI with the Thornthwaite (PET_Th) and Penman-Monteith equations (PET_PM).

"We find vast differences between PET_Th and PET_PM. However, the SWI derived from the two kinds of PET showed broadly similar characteristics in terms of the interdecadal variability of global and continental drylands," said Dr. Qing YANG, the first author of the study. "This was because precipitation variations made major contributions,

whereas PET changes contributed to a much lesser degree."

However, they also found distinct differences in the interdecadal variability of semi-arid and dry sub-humid regions. This indicated that the influence of PET changes was comparable to that of precipitation variations in the global dry-wet transition zone. Additionally, the contribution of PET changes to the variations in global and continental drylands gradually enhanced with global warming. "We found the Penman-Monteith method increasingly more applicable under climate change", said YANG.

The study was selected as the cover paper of Volume 34 Issue 12 of *Advances in Atmospheric Sciences*.

More information: Qing Yang et al, Sensitivity of potential evapotranspiration estimation to the Thornthwaite and Penman–Monteith methods in the study of global drylands, *Advances in Atmospheric Sciences* (2017). DOI: 10.1007/s00376-017-6313-1

Provided by Chinese Academy of Sciences