



Eurasia drought assessment based on Era5 reanalyses

Changdi Xue (1), Hua Wu (2), Wangmin Ying (2), Wan Li (2), and Xiaoguang Jiang (1)

(1) University of Chinese Academy of Sciences, College of Resource and Environment, BeiJing, China (wuh@lreis.ac.cn),

(2) State Key Laboratory of Resources and Environment Information System, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing 100101, China

In general, drought monitoring is the most commonly evaluated by drought index. The Palmer Drought Severity Index (PDSI) was created by Palmer (1965) with the intent to measure the cumulative effect in soil moisture supply and demand at the surface. However, this index is often lack of applicability in extremely dry area, and its calculation and application are very complex as well. So, this paper evaluates the spatial scope and temporal regularity of drought over eurasian continent at global warming from four parameters : precipitation, runoff, evaporation and soil moisture. As the latest generation of reanalysis data, ERA5 has been widely used in the field of remote sensing, because it has more atmospheric variable and finer resolution. Based on ERA5 reanalysis datasets, regional drought conditions are effectively assessed by calculating Standardized precipitation index (SPI) and the anomaly percentage between 2000-2017.

On the other hand, due to the impact of sea surface temperature (SST) on the drought, such as the SST forcings during 1950–2000 increase the summer land-ocean temperature contrast and thus enhance the drought. Therefore, we analyses SST and the height of the potential difference in recent years. Results are as follows: (1) Regional runoff has decreased every year since 2010, which could increase the frequency of drought. Except for parts of West Asia, the annual variation of precipitation in the other places are not significant, but the SPI is opposite. The next, soil moisture and precipitation are consistent in most regions, and the abnormal percentage is stable within 20%. However, the amount of evaporation increased significantly in 2017, which may be caused by global warming or El Niño. (2) At the same time, SST anomalous descending and ascending motion occurs over the northern Indian Ocean and South Pacific Ocean areas, while the SPI is anomalous. This is consistent with the above-mentioned drought conditions to some extent. But the specific contact between SST and drought formation still require further study. Overall, the frequency of droughts may not increase in the near future, but if they do, they may occur faster and more dramatically.

Index Terms—Drought assessment; ERA5; Global warming .