

Assessing satellite-derived drought indicesYunden Bayarjargal[†];[†] Geospatial Technology Transfer LLC, USALeading author: ybayarjargal@gmail.com

Assessing extreme climate events such as drought occurrence is challenging, and various methods have been developed based on ground- and satellite-based observations. Spatial distributions of different drought indices derived from the NOAA-AVHRR were examined from 1982 to 1999, during the vegetation-growing period (April - September) over the desert-steppe and desert ecosystems of Mongolia using the change vector analysis technique in the temporal domain. One group of the drought indices is based on vegetation state derived from the refractive channels. This group includes the Normalized Difference Vegetation Index (NDVI), Vegetation Condition Index (VCI), Anomaly of Normalized Difference Vegetation Index (NDVIA), and the Standardized Vegetation Index (SVI). Another group - the Temperature Condition Index (TCI) - is based on brightness temperature derived from the thermal channels. The third group is based on a combination between NDVI and land surface temperature (LST), including the ratio between LST and NDVI (LST/NDVI) and the Vegetation Temperature Condition Index (VT). Comparison analysis of these indices revealed that there is no spatial coincidence between them, even when the growing period was divided into two-month sub-periods - beginning, middle, and end. Furthermore, no agreement was found between the spatial extent of the satellite-derived drought indices and the traditional ground-observed drought-affected-areas maps. The former indices detect wider affected areas. Based on statistical analysis, higher correlations were found among the NDVI-based indices than among the indices derived from the LST and the combination of LST and NDVI indices. Time series analysis along 18 years reveals no significant trend in any of the indices. Moreover, different indices indicate different trends. The NDVI-based indices produce a negative trend that differs from the common theory that drought frequency has been increasing over the Mongolian Gobi region. The TCI shows a positive trend, and the LST/NDVI and VT minimal trends. In summary, this study finds it difficult to point out the most reliable drought index, and the ground observations cannot provide sufficient information for validation.