

# Agricultural Drought Assessment in Nine Agricultural Regions of China through Cross-Validation of Multiple Data Products and Multiple Drought Indices

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## Abstract

Agricultural drought threatens global water security, food security, and human well-being. Accurate identification of agricultural drought is the premise of all work. However, it is currently challenging to achieve relatively reliable and accurate assessments using remote sensing data products. We selected soil moisture datasets from GLDAS, FLDAS, ERA5-land, and MERRA-2, precipitation from GPCP, and vegetation conditions from NDVI. Drought Severity Index (DSI), Soil Moisture Anomaly index (SMA), Standardized Precipitation Index (SPI), and Vegetation Condition Index (VCI) were calculated separately in regions with different wet and dry conditions. The objective was to find relatively reliable and accurate product and drought index by cross-validation, then apply them to agricultural drought assessment in nine agricultural regions of China. The results showed that: (1) Under different wet and dry conditions, the DSI calculated using GLDAS showed good performance in identifying agricultural drought; (2) The northern arid and semiarid region, the Northeast Plain, the Huang-Huai-Hai Plain, and the Loess Plateau frequently experienced moderate and severe agricultural droughts, especially in the region of the boundaries. Besides, the northern part of Qinghai-Tibet and the northwest region of the Yunnan-Guizhou Plateau, all with a frequency of about 20%; (3) Agricultural droughts in the agricultural regions of northern China have significantly slowed in the last 20 years, both the Yunnan-Guizhou plateau and Southern China have shown a significant increasing trend since 2002. Future agricultural droughts in the humid south need to receive more attention. This paper could help to better understand China's agricultural drought and could provide a method for agricultural drought assessment in regions without observational data.

**Keywords:** agricultural drought, GLDAS, DSI, nine agricultural regions, China.

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