



Evaluating The Impact of Agriculture Drought by Remote Sensing Drought Indices in 2011–2021: A Case Study of Southwest Taiwan

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Agricultural drought is attributed to the deficit of soil moisture in the agricultural area for a period, and might cause the crops failure during the specific growth period. This issue has drawn increasing attention in the contemporary climate change episode. In the first half of 2021, the delayed and reduced spring rains were anomalously insufficient and had induced severe impacts on the agricultural production of southwest Taiwan. The aim of this study is thus to understand the dynamic change of drought and its associated impact during the two main harvest periods in the main agricultural region of southwestern Taiwan. We analyze a time series of indices such as Vegetation Condition Index (VCI), Temperature Condition Index (TCI), Vegetation Health Index (VHI), Temperature Vegetation Dryness Index (TVDI), Vegetation Supply Water Index (VSWI), and Normalized Vegetation Supply Water Index (NVSWI). These indices are derived from MODIS datasets, including 8-day MOD11 LST and MOD13 NDVI products at 1 km resolution, in 2011–2021. Next, a supplemental dataset derived from optical satellite images is used for land-use classification, which could allow us to characterize actual agricultural zones in the region of interest. We also collect the statistics of paddy rice yield surveyed by the Agriculture and Food Agency of Taiwan for calibration between yield and drought indices.

The preliminary results show that the TVDI, TCI, VCI, VHI, VSWI have higher correlation in the 1st paddy rice harvest stage (Late June) of dry season than the 2nd paddy rice harvest stage (Mid-November) among the time series. The correlation coefficient is -0.88, 0.66, -0.85, 0.50, and 0.66, respectively. These indicated that the 1st paddy rice harvest stage could be more sensitive to the high temperature and deficit precipitation during the growing season.

Keywords □ Agricultural drought monitoring, MODIS, PRISMA, Drought indices