



Probabilistic drought intensification forecasts using temporal patterns of satellite-derived drought indicators

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A drought occurs when the condition of below-average precipitation in a region continues, resulting in prolonged water deficiency. A drought can last for weeks, months or even years, so can have a great influence on various ecosystems including human society. In order to effectively reduce agricultural and economic damage caused by droughts, drought monitoring and forecasts are crucial. Drought forecast research is typically conducted using in situ observations (or derived indices such as Standardized Precipitation Index (SPI)) and physical models. Recently, satellite remote sensing has been used for short term drought forecasts in combination with physical models. In this research, drought intensification was predicted using satellite-derived drought indices such as Normalized Difference Drought Index (NDDI), Normalized Multi-band Drought Index (NMDI), and Scaled Drought Condition Index (SDCI) generated from Moderate Resolution Imaging Spectroradiometer (MODIS) and Tropical Rainfall Measuring Mission (TRMM) products over the Korean Peninsula. Time series of each drought index at the 8 day interval was investigated to identify drought intensification patterns. Drought condition at the previous time step (i.e. 8 days before) and change in drought conditions between two previous time steps (e.g., between 16 days and 8 days before the time step to forecast) Results show that among three drought indices, SDCI provided the best performance to predict drought intensification compared to NDDI and NMDI through qualitative assessment. When quantitatively compared with SPI, SDCI showed a potential to be used for forecasting short term drought intensification. Finally this research provided a SDCI-based equation to predict short term drought intensification optimized over the Korean Peninsula.