



## **Microwave remote sensing of flash droughts during crop growing seasons**

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Severe short-term droughts frequently occurred over China in recent years, with devastating impacts on crop production. Short-term droughts during the crop growing seasons sometimes occur together with abnormally high temperature, and positive feedbacks between the land and atmosphere often intensify the drought conditions. These droughts are recently termed as “flash droughts” due to their rapid development, unusual intensity and devastating impacts. This study assesses the capability of microwave remote sensing in detecting soil moisture droughts over China and in providing early warnings. The 22-year (1992-2013) satellite surface soil moisture retrievals produced by the European Space Agency Climate Change Initiative (ESA CCI) are compared against the in-situ observations at 312 stations in China, the ERA Interim and GLDAS soil moisture reanalysis, and the observed rainfall deficit. Both the reanalysis and remote sensing products can only detect less than 60% of drought months over most in-situ stations, but they capture the responses of inter-annual drought variations to ENSO at river basin scales quite well. As compared with reanalysis, the satellite products provide independent drought information over sparsely observed regions such as northwestern China, and the active microwave product with better vegetation penetration works the best in southern China. This study suggests that the microwave remote sensing data is useful for soil moisture drought monitor as well as verification for drought modeling or forecasting.