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# Sub-seasonal forecasting of flash droughts in China

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Short-term droughts during the crop growing seasons sometimes occur with abnormally high temperature, the decreasing soil moisture but increasing evapotranspiration (ET) often intensify the drought conditions. These droughts are recently termed as “flash droughts” due to their rapid development, unusual intensity and devastating impacts. For example, a flash drought that lasted for less than a month during the summer of 2013 affected 13 provinces in southern China and damaged over 2 million hectares of crops in two southern provinces alone. Currently, seasonal forecasting of flash droughts remains a grand challenge because they usually happened without persistent oceanic anomalies while mainly due to the short-term anomalies in the atmospheric circulations and the land surface conditions. Moreover, forecasting of a flash drought event is not only to predict a water deficit, but also to predict a heat extreme (i.e. abnormally high temperature) and the water-energy coupling anomaly between the land and atmosphere (e.g., ET anomaly).
On the other hand, sub-seasonal to seasonal (S2S) forecasting that intends to bridge the weather and climate predictions for a seamless climate service is an emerging area and will also be essential for advancing the extended hydrological forecasting. Recently, a number of S2S projects including the second phase of the North American Multimodel Ensemble (NMME) project have been launched to understand the hydro-climate predictability from weeks to a season, and to explore its usefulness for the applications within the Global Framework for Climate Services. Therefore, the emerging S2S forecasting activities provide an unprecedent opportunity for improving the understanding of the predictability of flash drought, and sub-seasonal forecasting of flash drought will in turn be a good measure for assessing the phenomenological forecast skill of the S2S forecasting practices.
In this presentation, a 29-year daily NCEP Climate Forecast System Reanalysis and Reforecast (CFSRR) dataset, which was created by initiating CFSv2 model every five days, will be used to evaluate the skill for sub-seasonal forecasting of flash drought in China. The CFSv2 model is an ocean-atmosphere-land coupled climate forecast model that is participating in the NMME S2S forecasting project, and has been shown as one of the best models within the NMME seasonal drought forecasting community. The pentad-mean surface air temperature, soil moisture and ET from both the CFSR and CFSRR will be used to calculate the flash drought indices, where the former will serve as a reference for the hindcast verification. The predictive skill for the flash drought and its component variables will be analyzed to understand the predictability and the sources of uncertainty. This study will provide a first look on the sub-seasonal forecasting of flash drought by using a dynamical model.