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The Utility of the Standardized Evaporative Stress Ratio in Flash Drought Detection, Monitoring, and Evaluation

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Flash drought is a critical subseasonal phenomenon that leads to significant environmental and socioeconomic impacts. Given the short timeframe in which these events development (a few weeks to a couple of months), detection and monitoring of rapid drought intensification remains a challenging task. As such, it is essential to have an environmental variable or a set of environmental variables that effectively evaluate flash drought development. This presentation provides an overview of the standardized evaporative stress ratio (SESR) and its utility in 1) detecting flash drought events, 2) monitoring the evolution of flash drought development, 3) quantifying the intensity (rate of intensification) of flash drought, and 4) representing impact (evaporative stress) on the environment. While the calculation of SESR is relatively simple (the ratio of evapotranspiration and potential evapotranspiration), approaches using evaporative stress can provide a wealth of information with respect to flash drought characteristics (e.g., timing, intensity (rate of change towards drought), severity (magnitude of evaporative stress), length, and shape/evolution). The diverse utility of SESR is presented with known flash drought case studies, such as the 2012 flash drought in the central United States and the 2010 flash drought in western Russia. Additional applications of SESR are also discussed, including climatological analysis and real-time flash drought monitoring.