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Sensitivity of carbon fluxes to flash drought based on long-term FLUXNET and satellite observations

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Flash drought is characterized by a rapid onset at subseasonal time scale and enormous impact on society and economics. However, only few extreme case studies assessed the impact of flash drought on vegetation, without specific definition to identify the rapidly intensification stage of flash drought. Here, we use soil moisture to identify flash drought events at in-situ and regional scales, and detect the response of vegetation photosynthetic function using eddy covariance and satellite observations of carbon fluxes and sun-induced chlorophyll fluorescence (SIF). Different vegetation types show high sensitivity to flash drought especially for savanna and grassland, and the lag time between flash drought and ecological response is usually 8-16 days. The resistance of woody plants can be attributed to the positive anomalies of inherent water use efficiency during flash drought. Vegetation over semi-arid and semi-humid is also vulnerable to flash drought. The quick response of vegetation to flash drought is a new challenge for drought monitoring.