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Impacts of vegetation greenness on the sensitivity of terrestrial ecosystem productivity to flash drought in China

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Vegetation greening in the recent three decades significantly alters the carbon and water cycles over China. The response of terrestrial ecosystem productivity to flash droughts could be influenced by vegetation conditions and characteristics of flash droughts. However, it is still unclear that how the sensitivity of vegetation to flash drought varies with increasing leaf area index (LAI) across China. We use a land surface model and multiple satellite LAI products to assess the response of gross primary productivity (GPP) to flash droughts. Evapotranspiration is increased with increasing LAI and soil moisture is correspondingly decreased. Thus, the frequency, duration, and severity of flash droughts are all intensified from a water-budget perspective. The increasing LAI is contributed to the enhanced terrestrial carbon sink through increasing water use efficiency (WUE). The resistance and resilience of GPP to flash drought are also enhanced due to the increased LAI across various climates and vegetation types. These results refine the sensitivity of GPP to flash droughts in greening China and constrain the prognostic models to simulate the response of vegetation to droughts in changing environments.