EGU21-16380
https://doi.org/10.5194/egusphere-egu21-16380
EGU General Assembly 2021

Flash drought in Australia: deriving a long-term climatology from drought metrics based on precipitation, evapotranspiration, and evaporative demand.

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Until the scientific community coalesces around a consensus definition of flash drought, we might usefully distinguish them from “ordinary” droughts by applying a criterion of a rapid intensification from near-normal soil moisture to drought conditions over a period of a few weeks. Here, we use such a definition to generate the first spatially distributed, long-term climatology of flash droughts across Australia, which we derive using a suite of indices that capture both the supply and the demand perspectives of drought: evaporative demand describes the atmospheric demand for moisture from the surface; precipitation, the supply of moisture from the atmosphere to the surface; and evaporative stress, the supply of moisture from the surface relative to evaporative demand.

Regardless of metric-based definition, flash droughts are observed across all seasons. They can terminate as rapidly as they start, but in some cases can eventuate in a seasonal-scale drought. We show that flash-drought variability and its prevalence can be related to ENSO phases, which suggests an opportunity for enhanced seasonal-scale prediction. We examine a case study in the Wimmera Region of southeast Australia (around the South Australia / Victoria border), we show that monitoring precipitation is less useful for capturing the onset of flash drought. Instead, indices that capture the demand perspective of drought--such as the Evaporative Demand Drought Index (EDDI) and Evaporative Stress Index (ESI)--are more useful for monitoring flash-drought development.