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## Early detection of the flash drought: a preliminary study by the National Water Model

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As one key innovation in the NOAA hydrological modeling, the National Water Model (NWM) was recently upgraded to v2.0 in June 2019. The NWM could provide not only the streamflow prediction for hydrological guidance, but also the real-time high-resolution land state analysis and assimilation. Based on the NWM v2.0 retrospective analysis from 1993 to 2018, we evaluated NWM soil moisture (SM) and evapotranspiration(ET) for the drought monitor application. The Soil Moisture Percentile (SMP) from NWM is compared with the official US drought monitor (USDM) map in major drought events. The drought categories (D0-D4) based on NWM, is quantitatively compared with similar drought monitor from the NLDAS2 multi-model ensemble. A long time-series soil moisture monitor from CPC leaky bucket model is also compared against NWM, to distinguish the importance of the long temporal record vs high spatial resolution for drought monitor. The rapid intensification or rapid onset drought, i.e. flash drought, is also investigated by the temporal change of the SMP. The preliminary results indicated the NWM could well capture the major droughts during 2000 to 2018. In particular, the flash droughts indicated by the NWM could provide one to three weeks early warning than the USDM map, show great potential in the future application for flash drought detection, monitor and prediction.