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Assess 21st century Flash Drought in the United States using high resolution regional climate models

Brandi Gamelin, Jiali Wang, and V. Rao Kotamarthi
Argonne National Laboratory, Environmental Science Division, Argonne, United States of America (bgamelin@anl.gov)

Flash droughts are the rapid intensification of drought conditions generally associated with increased temperatures and decreased precipitation on short time scales. Consequently, flash droughts are responsible for reduced soil moisture which contributes to diminished agricultural yields and lower groundwater levels. Drought management, especially flash drought in the United States is vital to address the human and economic impact of crop loss, diminished water resources and increased wildfire risk. In previous research, climate change scenarios show increased growing season (i.e. frost-free days) and drying in soil moisture over most of the United States by 2100. Understanding projected flash drought is important to assess regional variability, frequency and intensity of flash droughts under future climate change scenarios. Data for this work was produced with the Weather Research and Forecasting (WRF) model. Initial and boundary conditions for the model were supplied by CCSM4, GFDL-ESM2G, and HadGEM2-ES and based on the 8.5 Representative Concentration Pathway (RCP8.5). The WRF model was downscaled to a 12 km spatial resolution for three climate time frames: 1995-2004 (Historical), 2045-2054 (Mid), and 2085-2094 (Late). A key characteristic of flash drought is the rapid onset and intensification of dry conditions. For this, we identify onset with vapor pressure deficit during each time frame. Known flash drought cases during the Historical run are identified and compared to flash droughts in the Mid and Late 21st century.