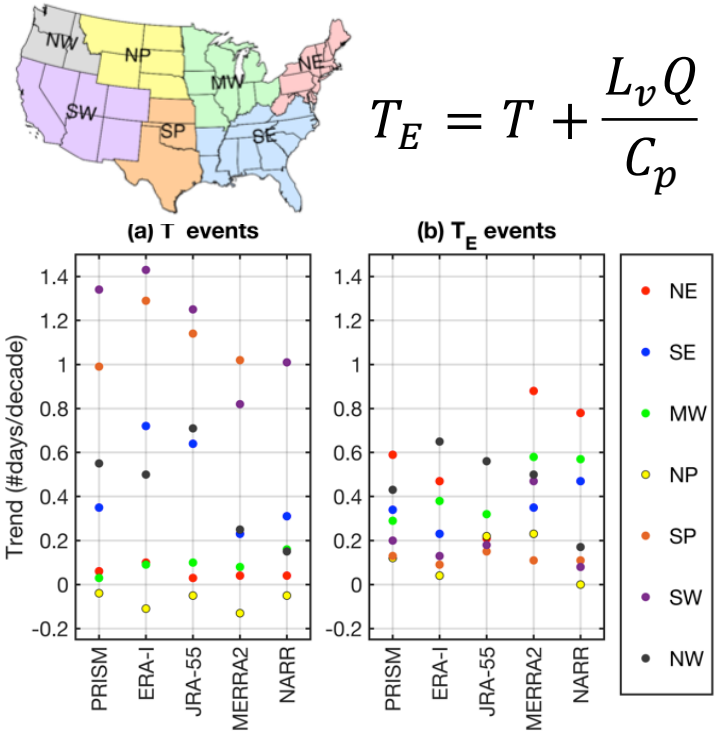
Recent changes in United States heat wave characteristics derived from multiple reanalyses

U.S. Department of Energy
FACETS
Framework for Assessing Climate's Energy-Water-Land Nexus using Targeted Simulations



Linear trends in the frequency of (a) T-only (i.e. T > local p95th percentile, p95) & (b) T-and-T_E (T & T_E > local p95) extreme heat days (EHD) 1981-2015 from the PRISM data set and using 4 reanalysis products.

Schoof J.T., Ford T. & Pryor S.C. (2017): Recent changes in United States heat wave characteristics derived from multiple reanalyses. *Journal of Applied Meteorology and Climatology* **56** 2621-2636.

Scientific Achievement

Near-surface temperature and specific humidity from PRISM & 4 reanalyses are used to quantify historical trends in frequency (freq), intensity (int.) & spatial extent (area) of extreme T-only & T & T_E extreme heat days (EHD). The southwest and southern Great Plains exhibit strong positive trends in freq./int./area T-only EHD. All other regions exhibit strongest positive trends in freq/int./area T&T_E EHD.

Significance and Impact

Impacts from extreme heat (T) depend on specific humidity (Q). Dry heat (high T only) ➢ agricultural losses. Wet heat (high T & high T_E) ➢ excess human mortality & morbidity. Thus, we need to use composite variables (e.g. equivalent temperature f(T & Q)) to characterize heat waves. T_E is also an integrative metric of static energy & at energy-water-land nexus i.e. f(partitioning; sensible v. latent heat fluxes).

Research Details

Our research illustrates long-term tendencies in EHD and shows events associated with human health impacts are increasing in frequency, intensity and area affected.

U.S. DEPARTMENT OF ENERGY | Office of Science
Cornell University · Iowa State University · Pacific Northwest National Laboratory · NCAR · Texas A&M · UCLA