

2017 CESM workshop:
June 20, 2017 Boulder, CO

Multi-year Predictions of North American Climate, Drought, and Wildfire

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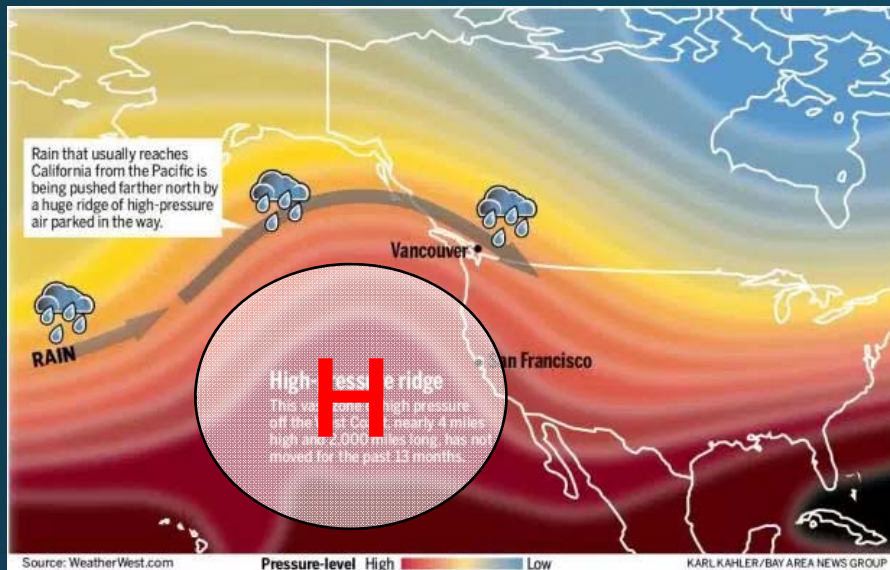
Chikamoto et al., (2017): Multi-year predictability of climate, drought, and wildfire in southwestern North America, Scientific Reports, revised.

Community Earth System Model

CESM



Climate-drought relationship



By PAUL ROGERS (progers@bayareanewsgroup.com)



Hypothesis: the wet/dry conditions in the western US are mainly controlled by ocean condition.

Community Earth System Model v1.0

Physical components

- Atmosphere (T31)
- Ocean (3 degree)
- Land (T31)
- Sea-ice (3 degree)



Data Assimilation



External forcing

- 20th century forcing + RCP4.5

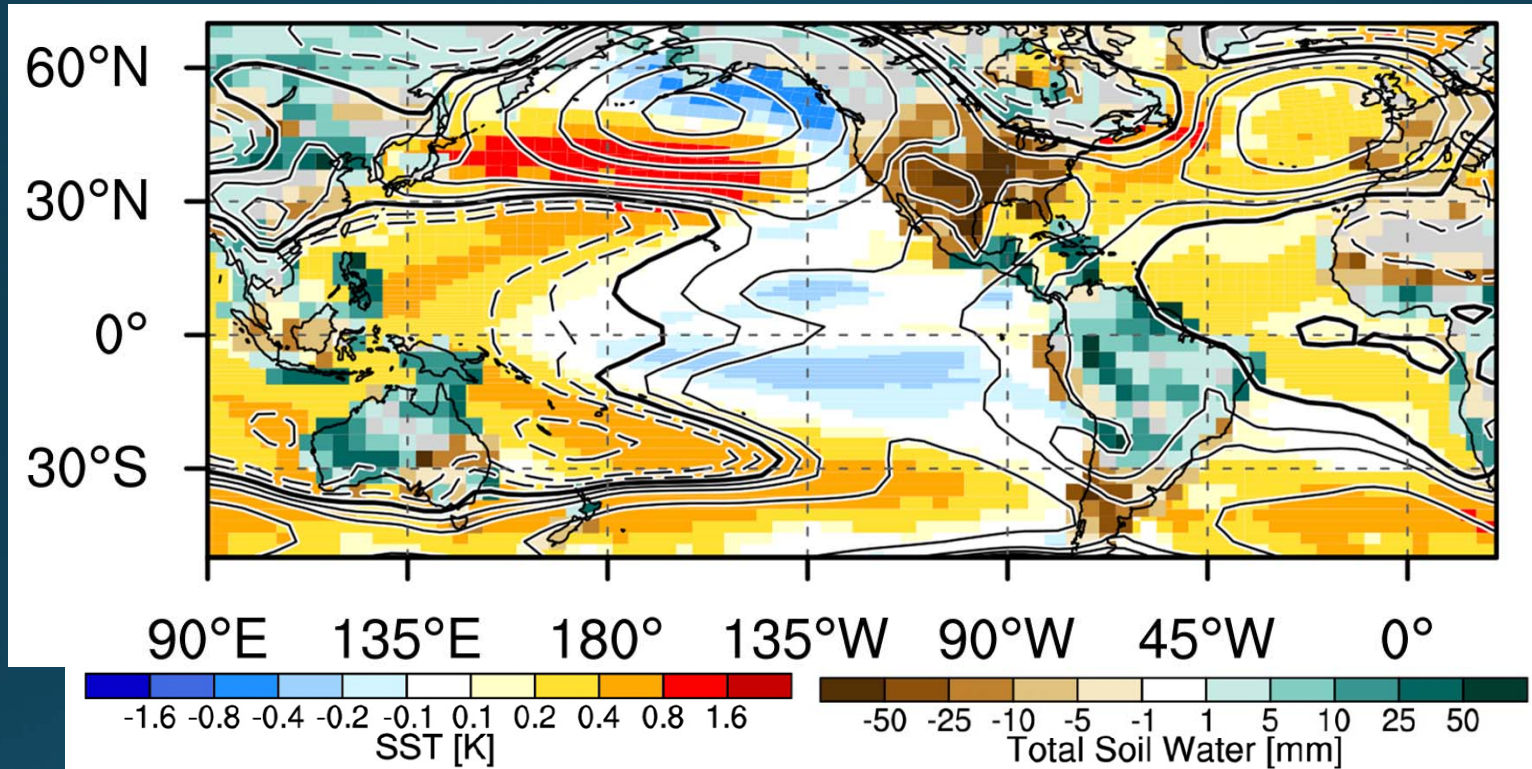


Experiments

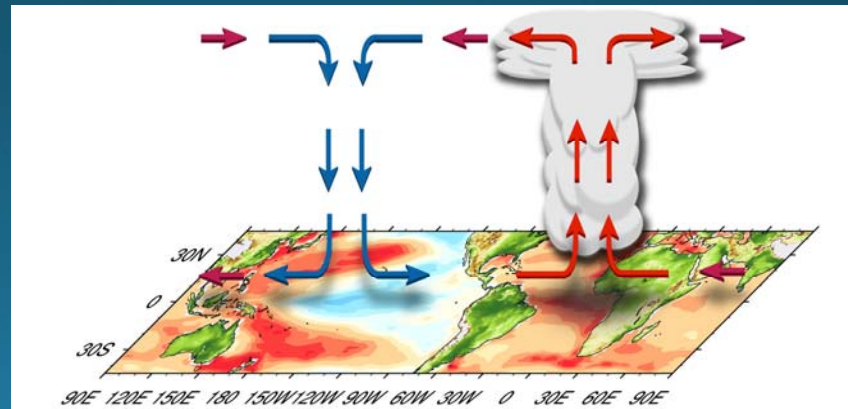
- Externally forced run: 1850-2030
- Ocean data assimilation run: 1958-2015
- Hindcast run: every year from 1960-2015
 - Start date: Jan 1st

All runs have 10 ensemble members

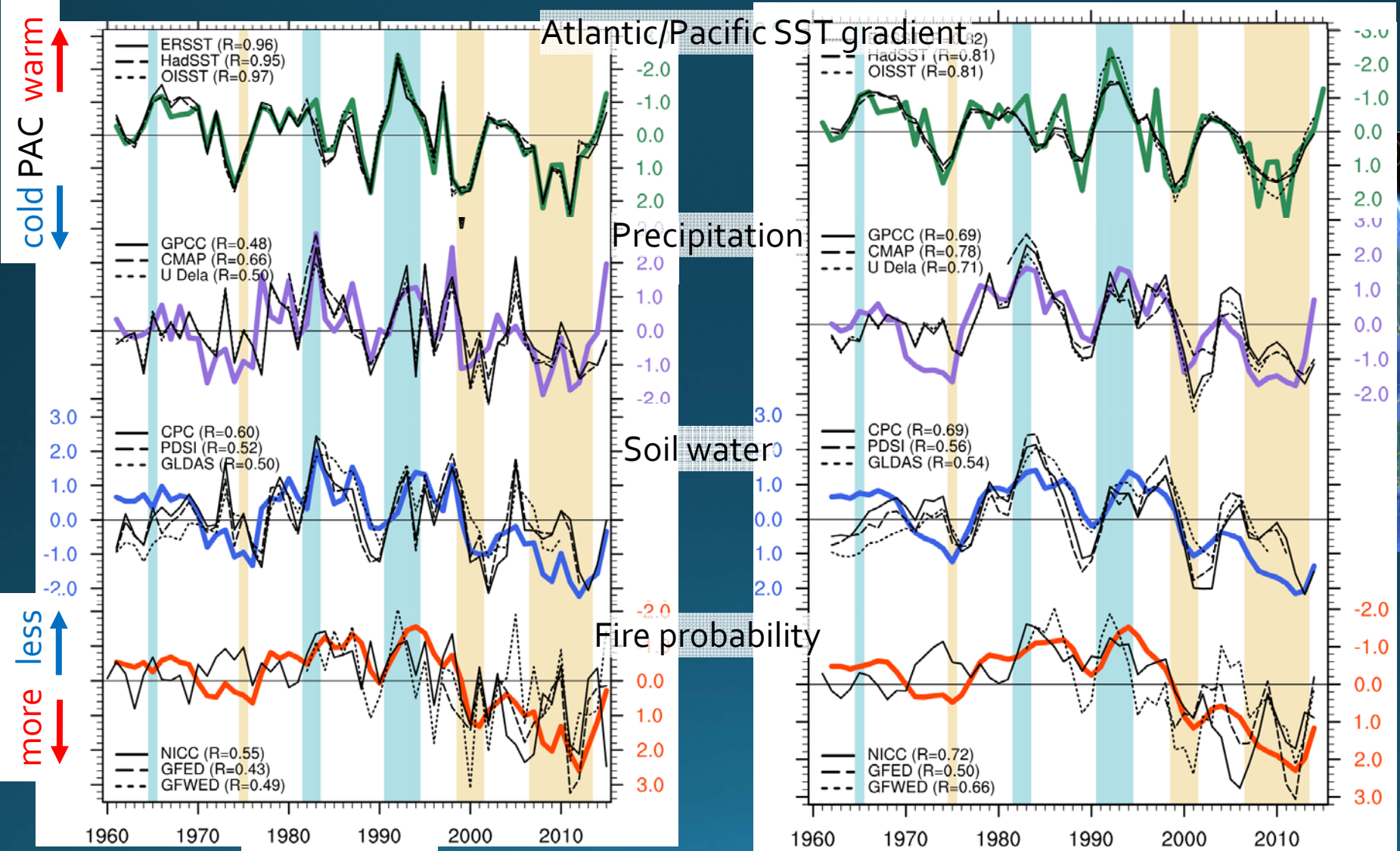
Tropical Trans-Basin Variability (TBV)



Chikamoto et al. (2015)



CESM simulated drought & fire



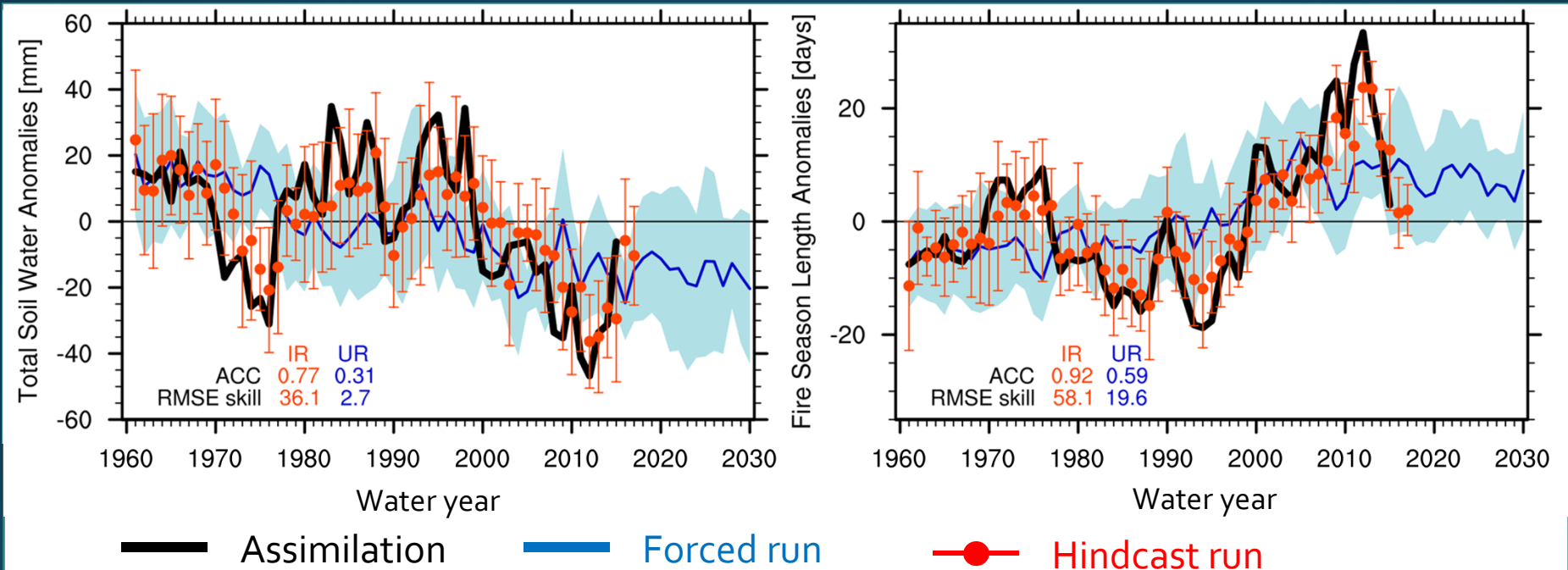
Water year

Chikamoto et al., (2017)

Hindcast/forecast: 10-22 month lead

Total Water Storage

Fire Probability

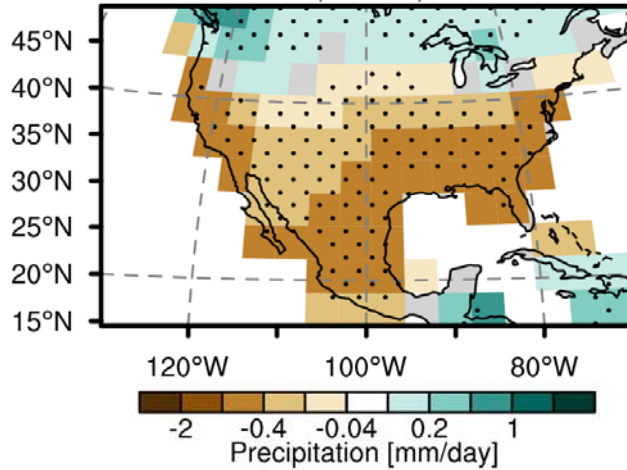


Decadal Climate Prediction is applicable to multi-year drought-fire predictions!!!

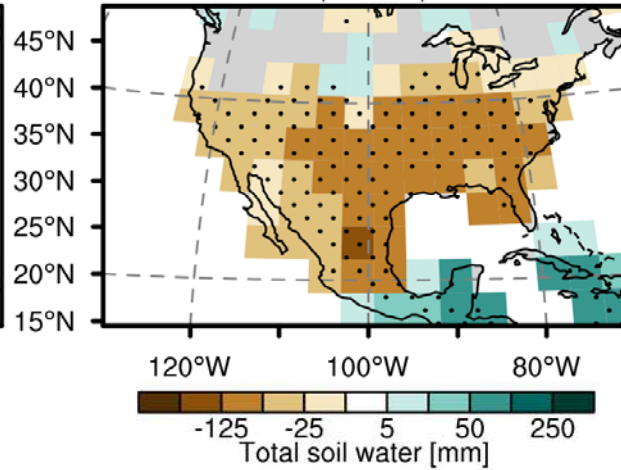


TBV composite diff.: Cold Season

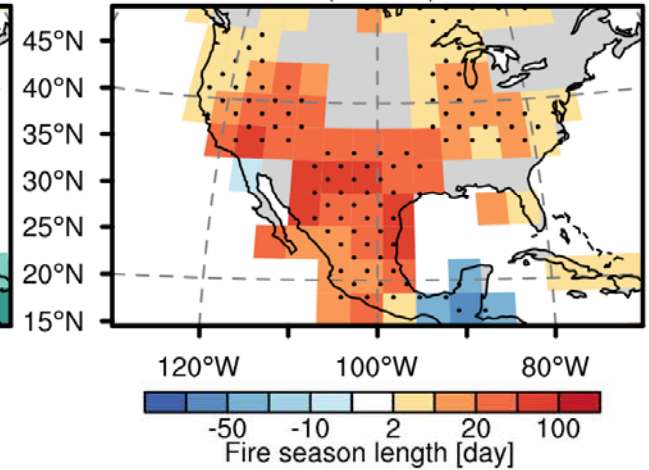
Precipitation (CESM)



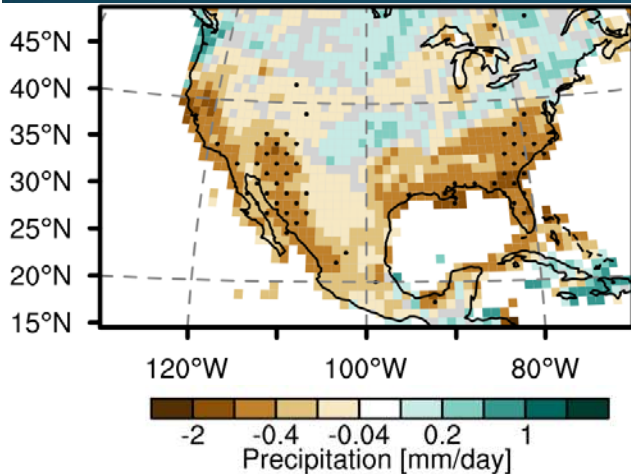
Soil Water (CESM)



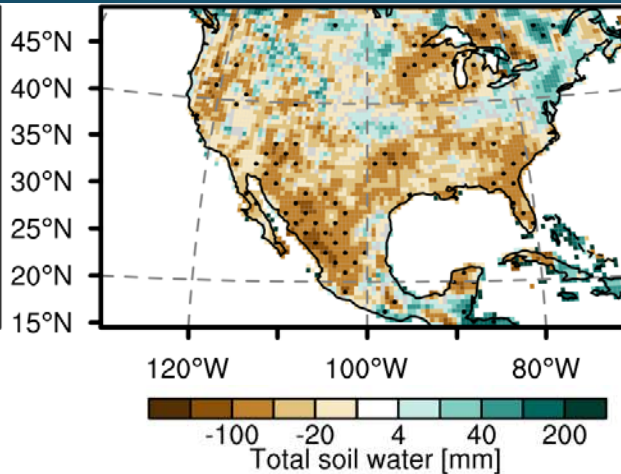
Fire Length (CESM)



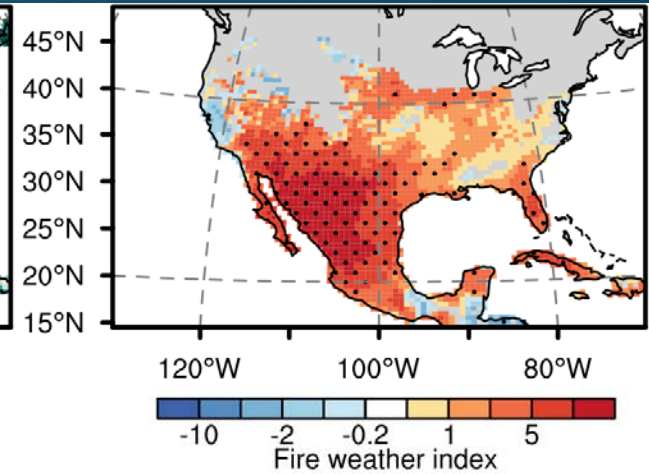
Precipitation (GPCP)



Soil Water (CPC)

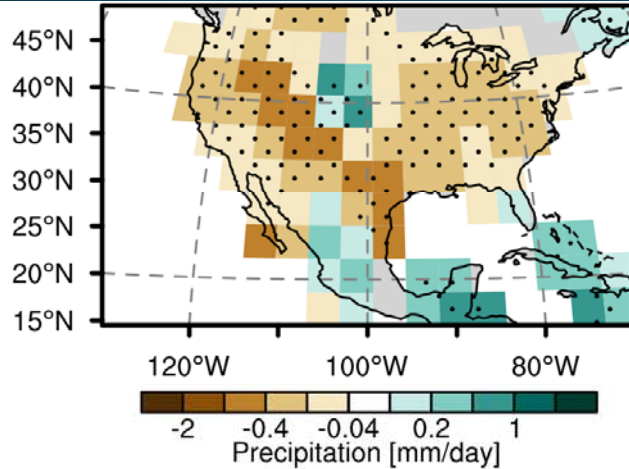


Fire Index (GFWED)

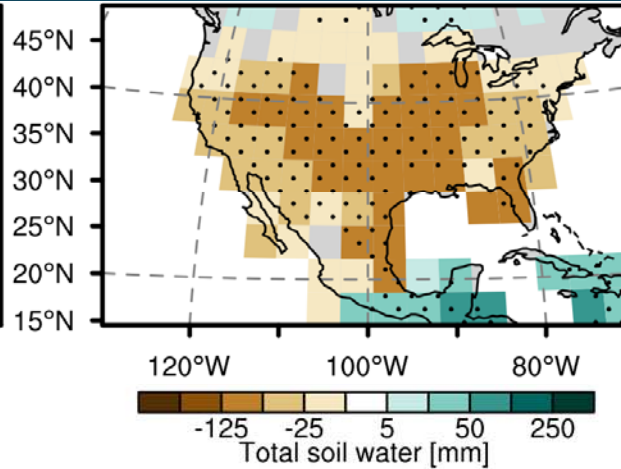


TBV composite diff.: Warm Season

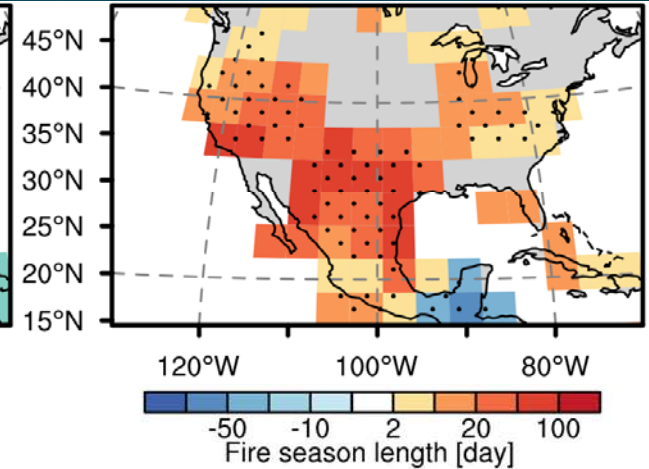
Precipitation (CESM)



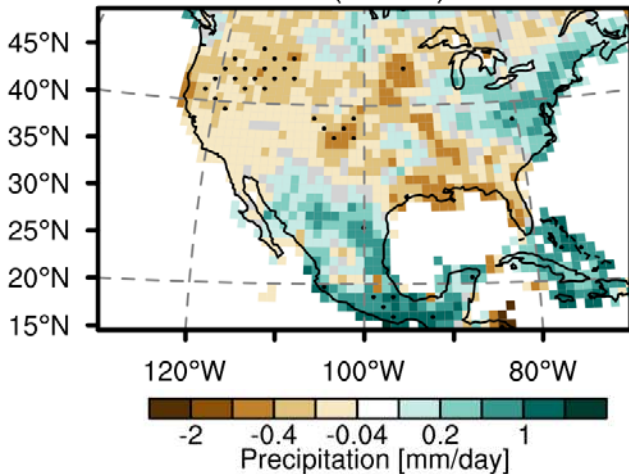
Soil Water (CESM)



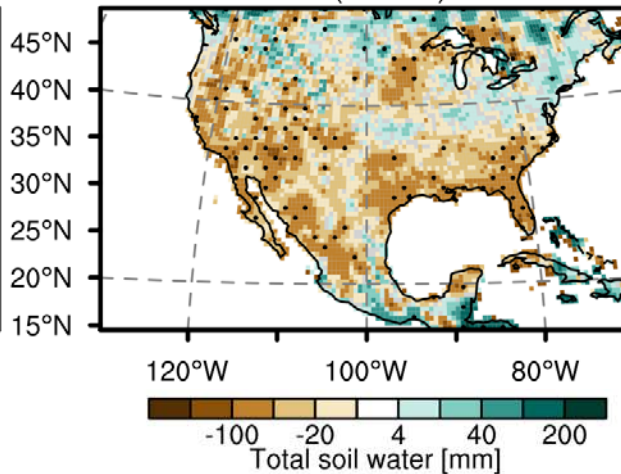
Fire Length (CESM)



Precipitation (GPCC)



Soil Water (CPC)



Fire Index (GFWED)

