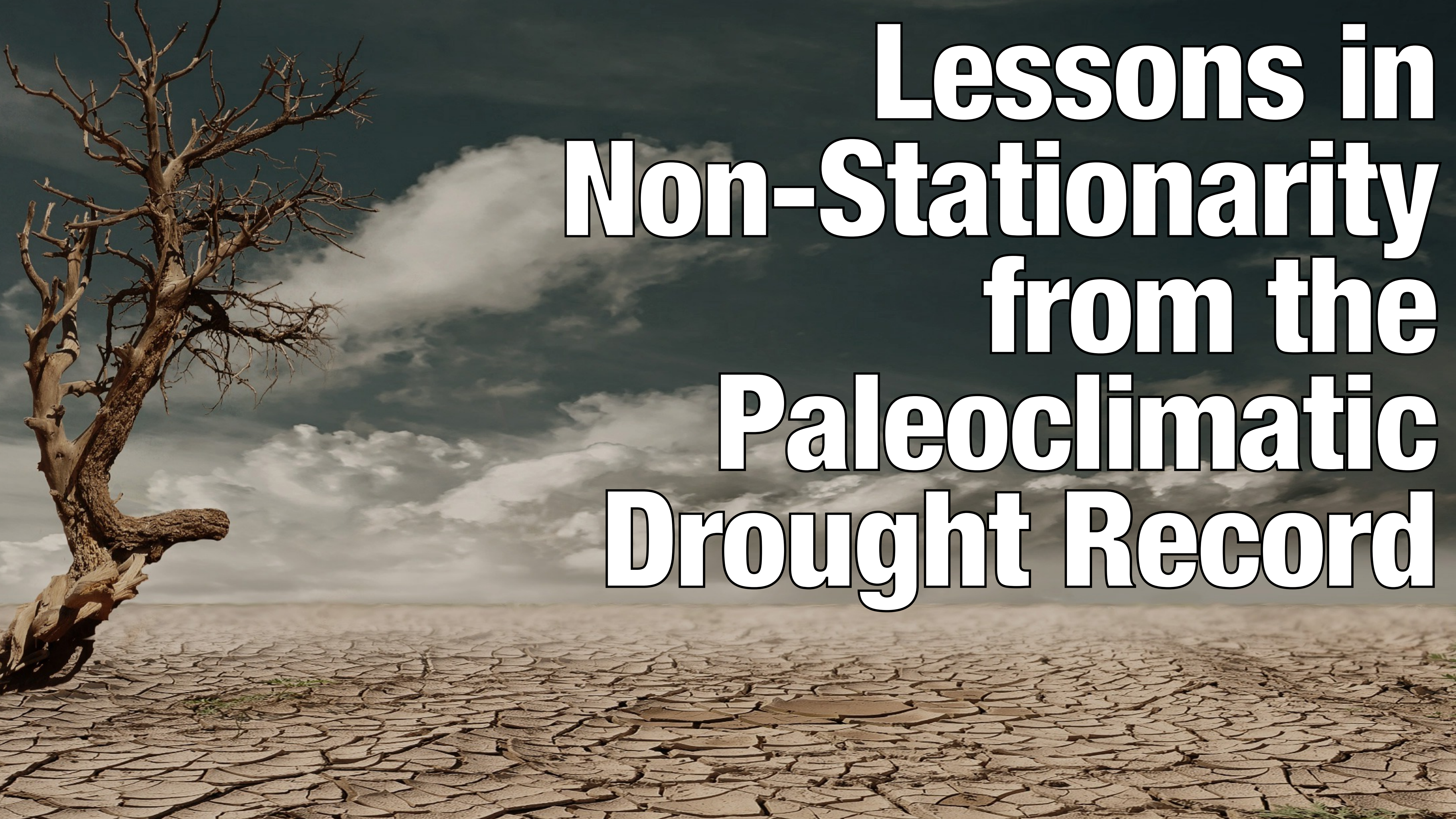
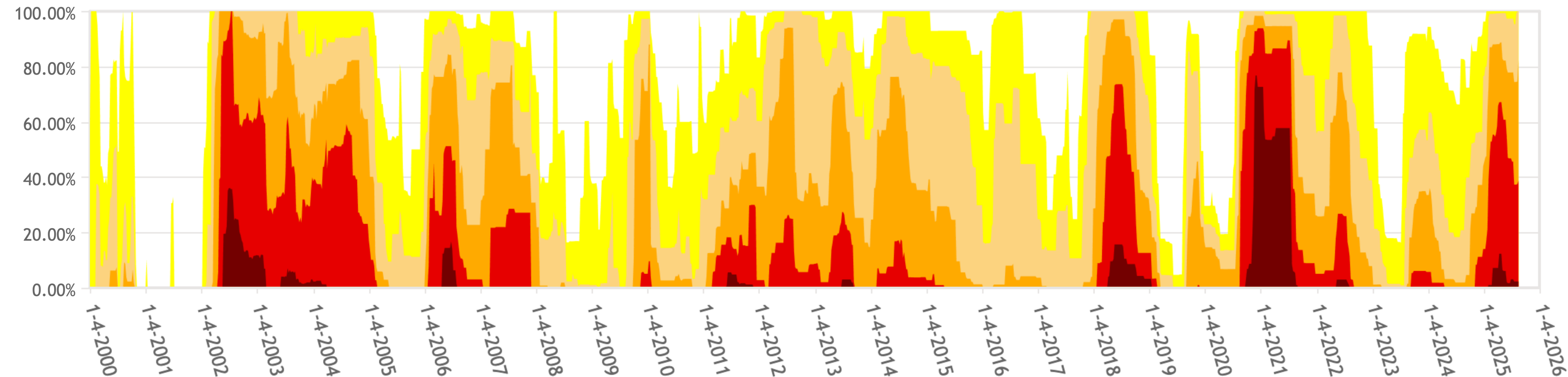


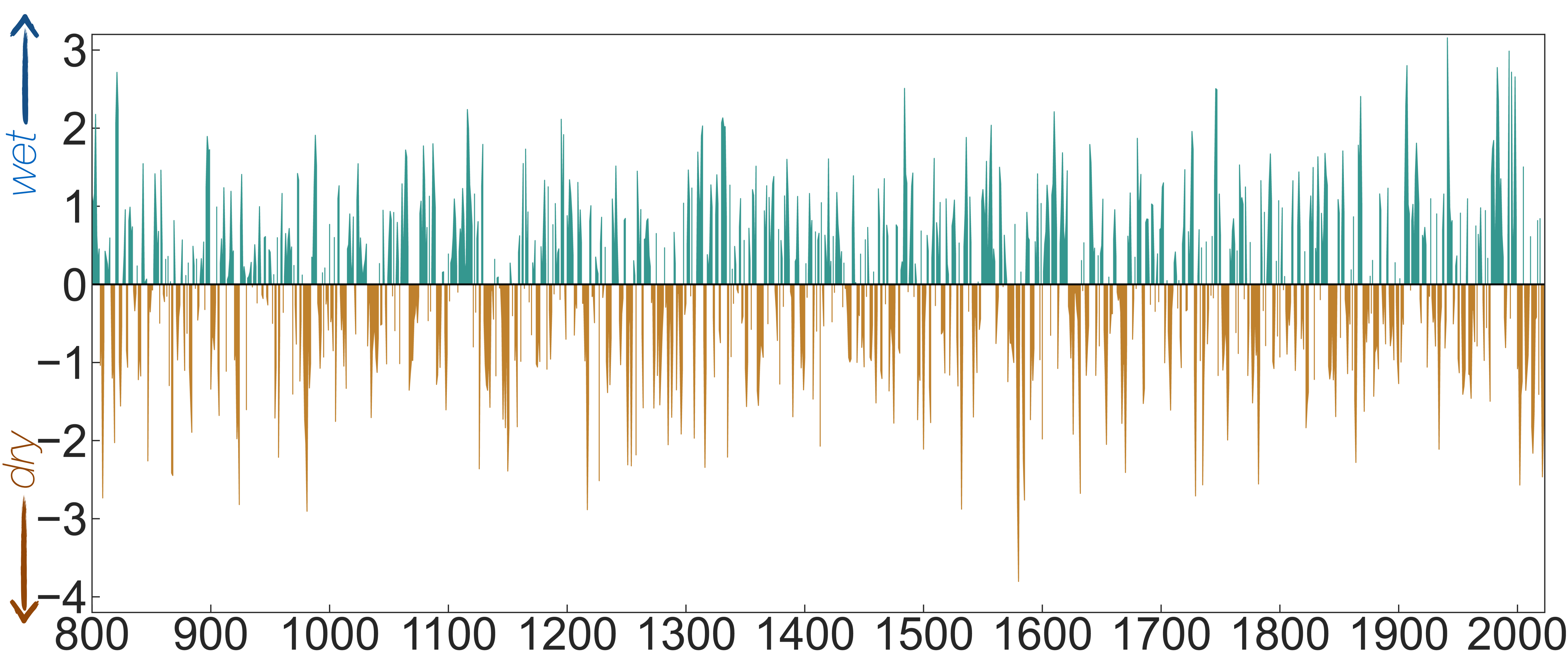


Lessons in Non-Stationarity from the Paleoclimatic Drought Record

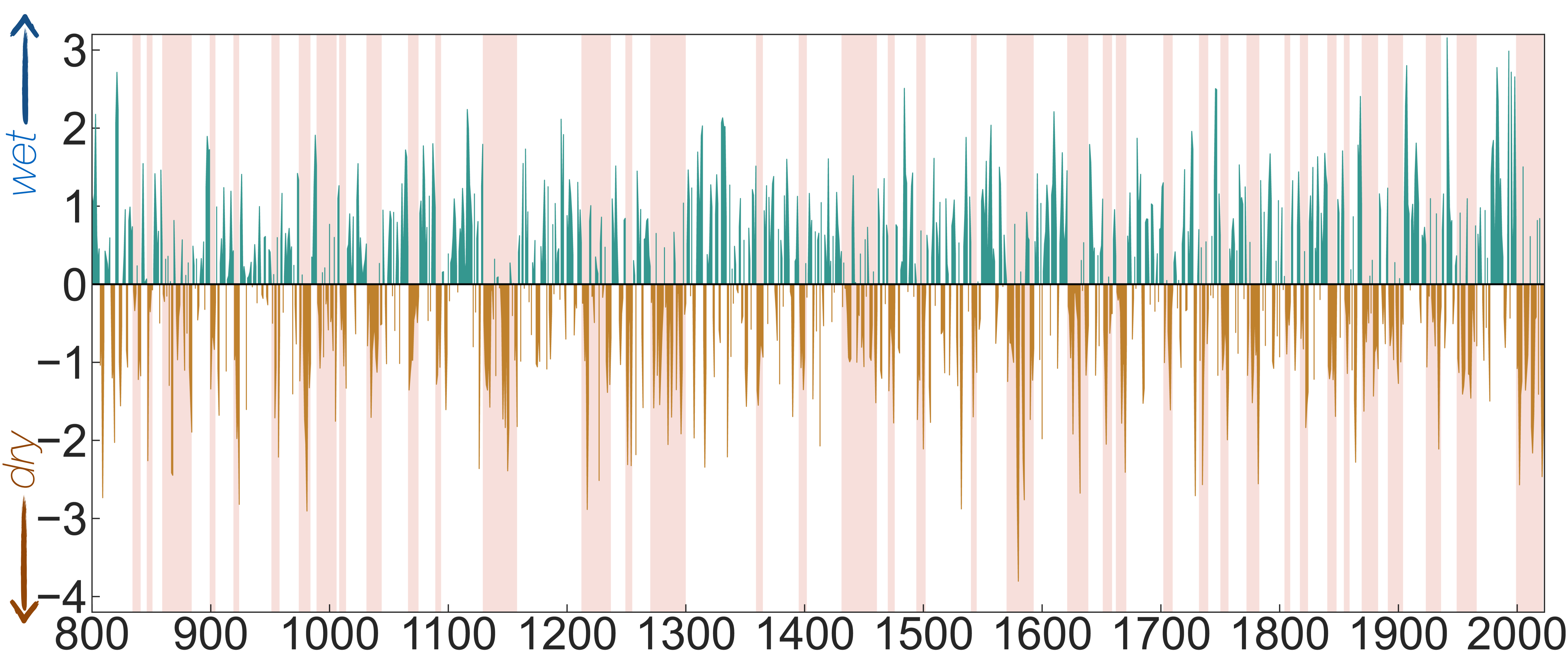
US Drought Monitor

Arizona Percent Area in U.S. Drought Monitor Categories

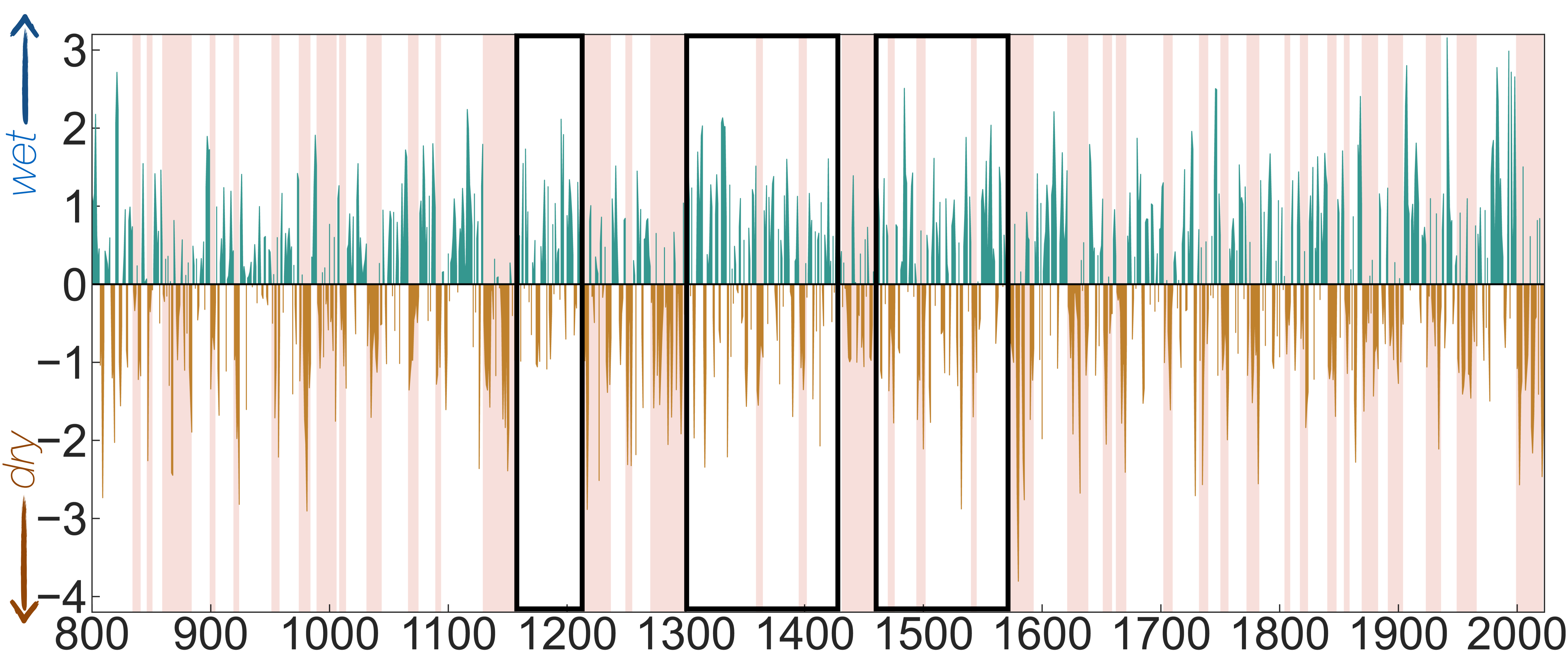




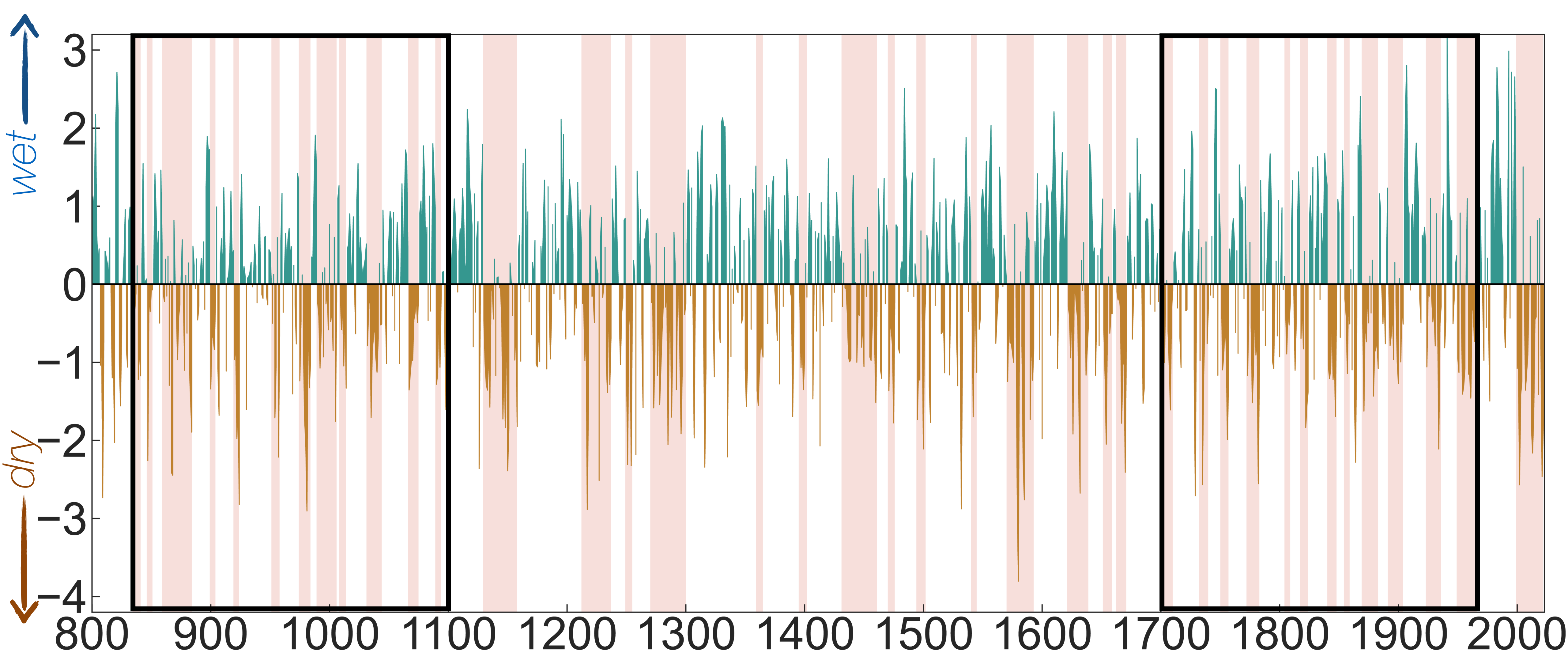
Southwestern North America Soil Moisture
(σ, 800-2023 CE)



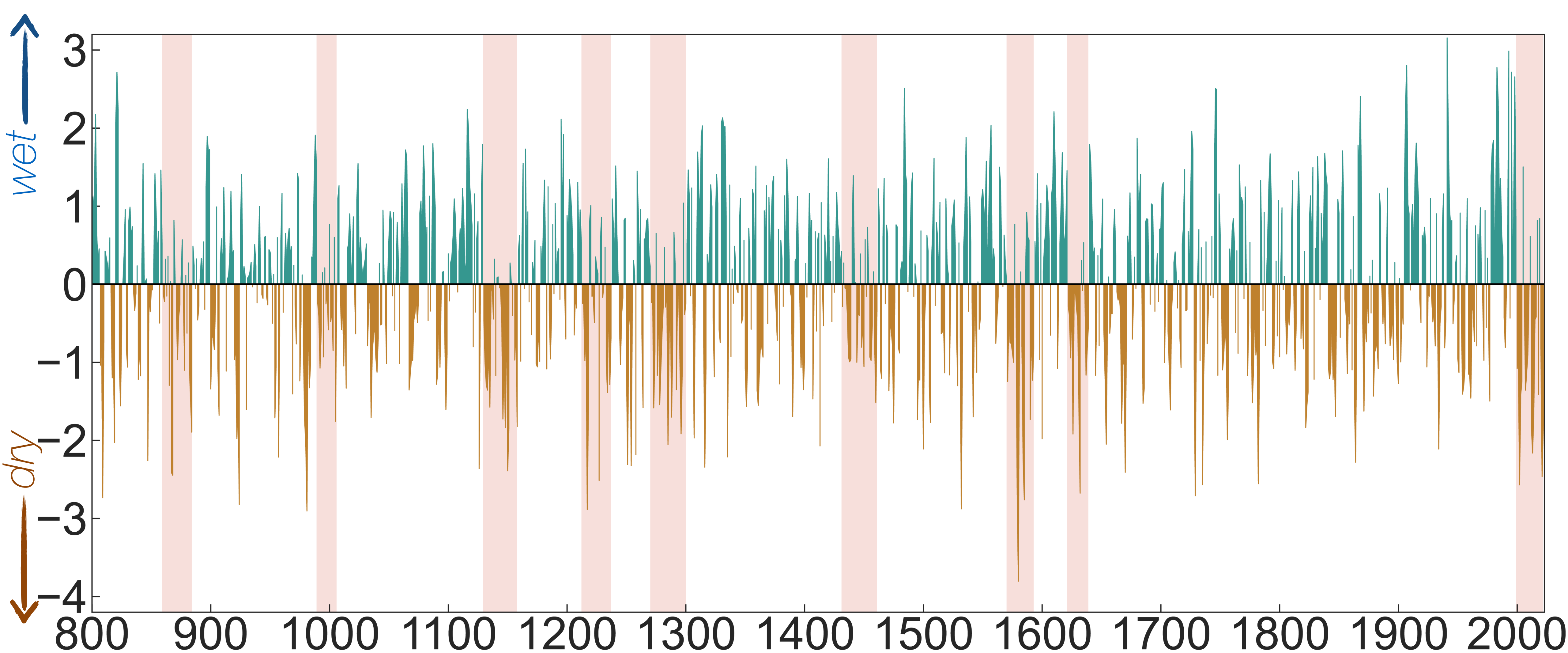
Persistent (5+ yr) Droughts



Quiescent Periods

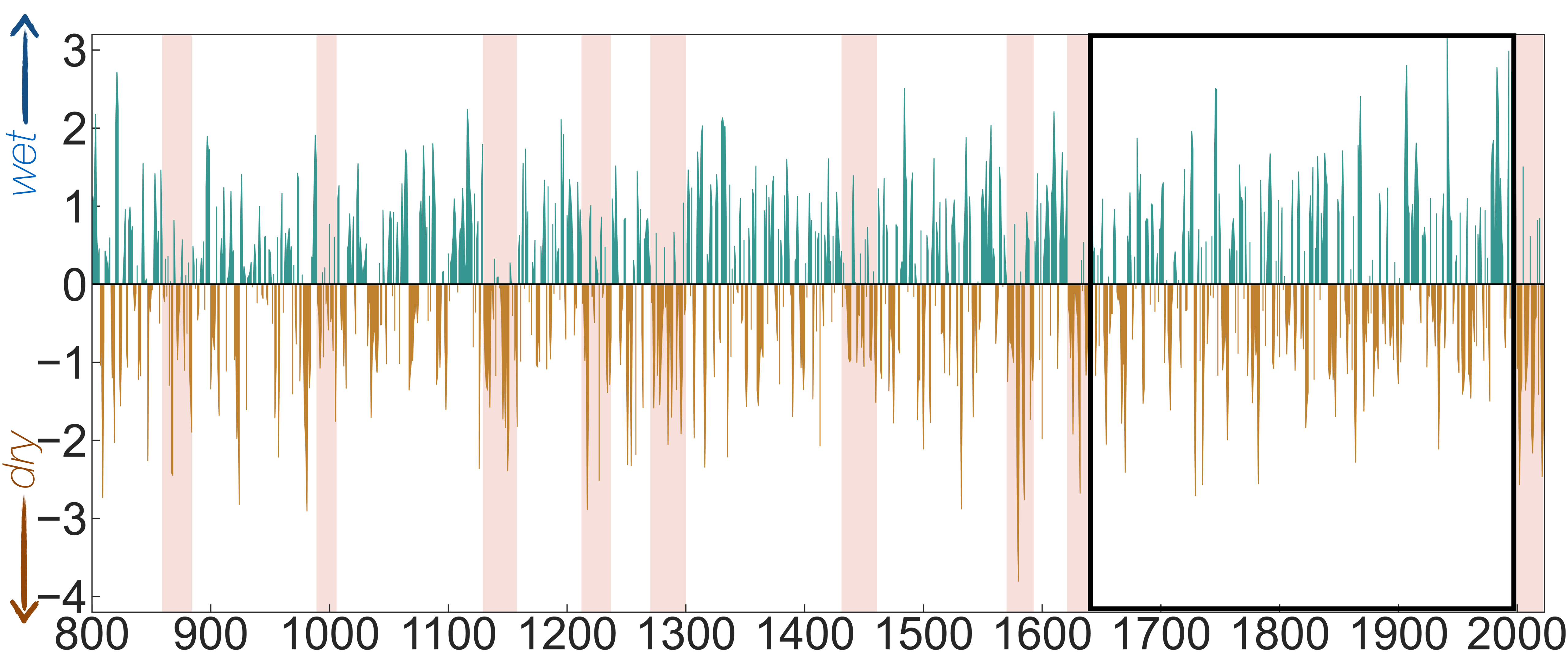


Active Intervals

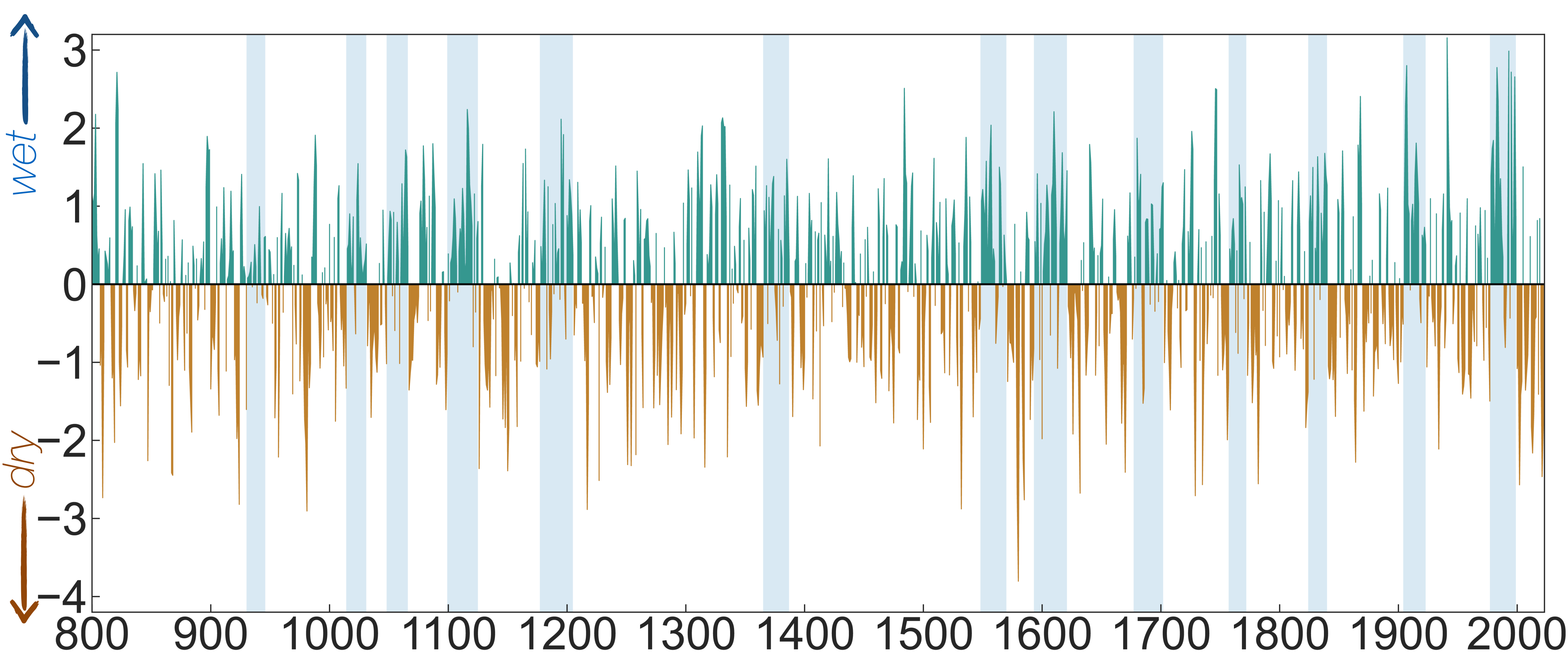


MEGADROUGHTS

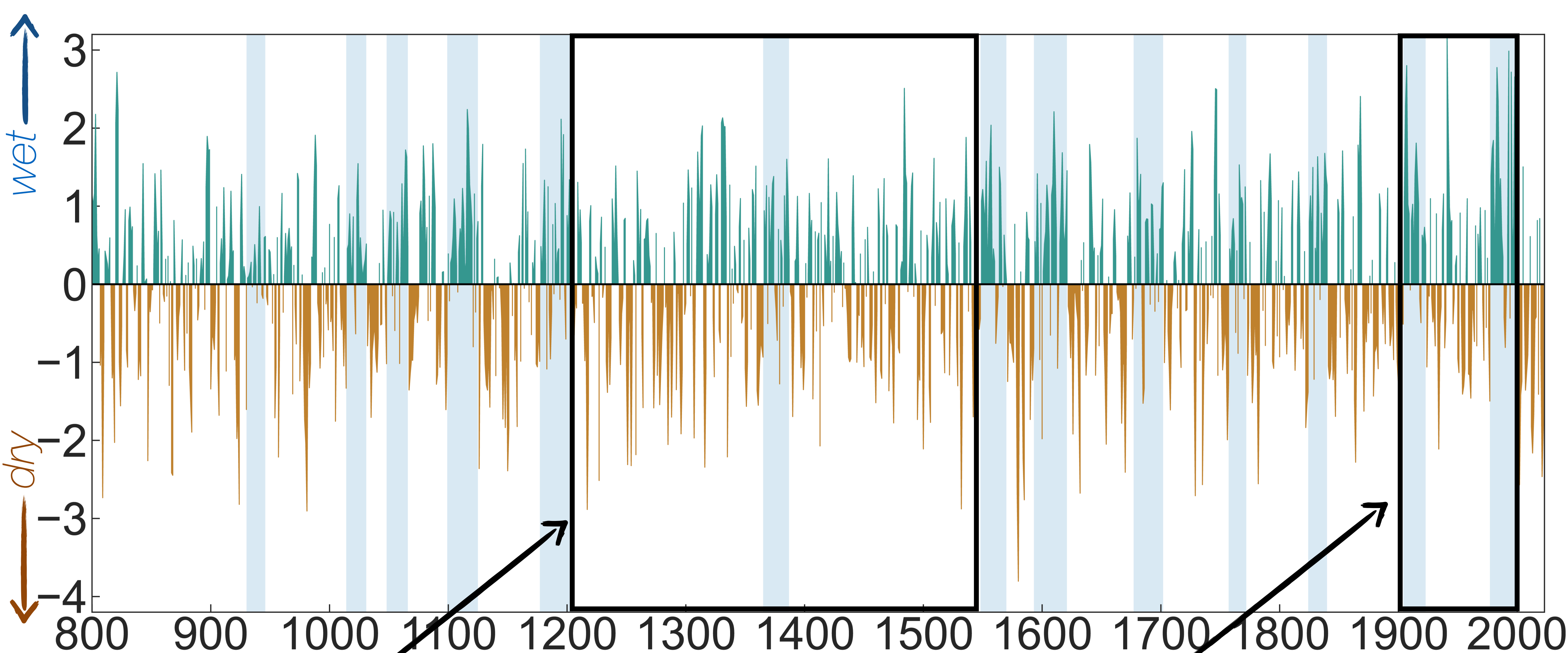
persistent, multiyear drought events that are exceptional in terms of severity, duration, or spatial extent when compared with other regional droughts during the instrumental period or the CE



+300 year hiatus



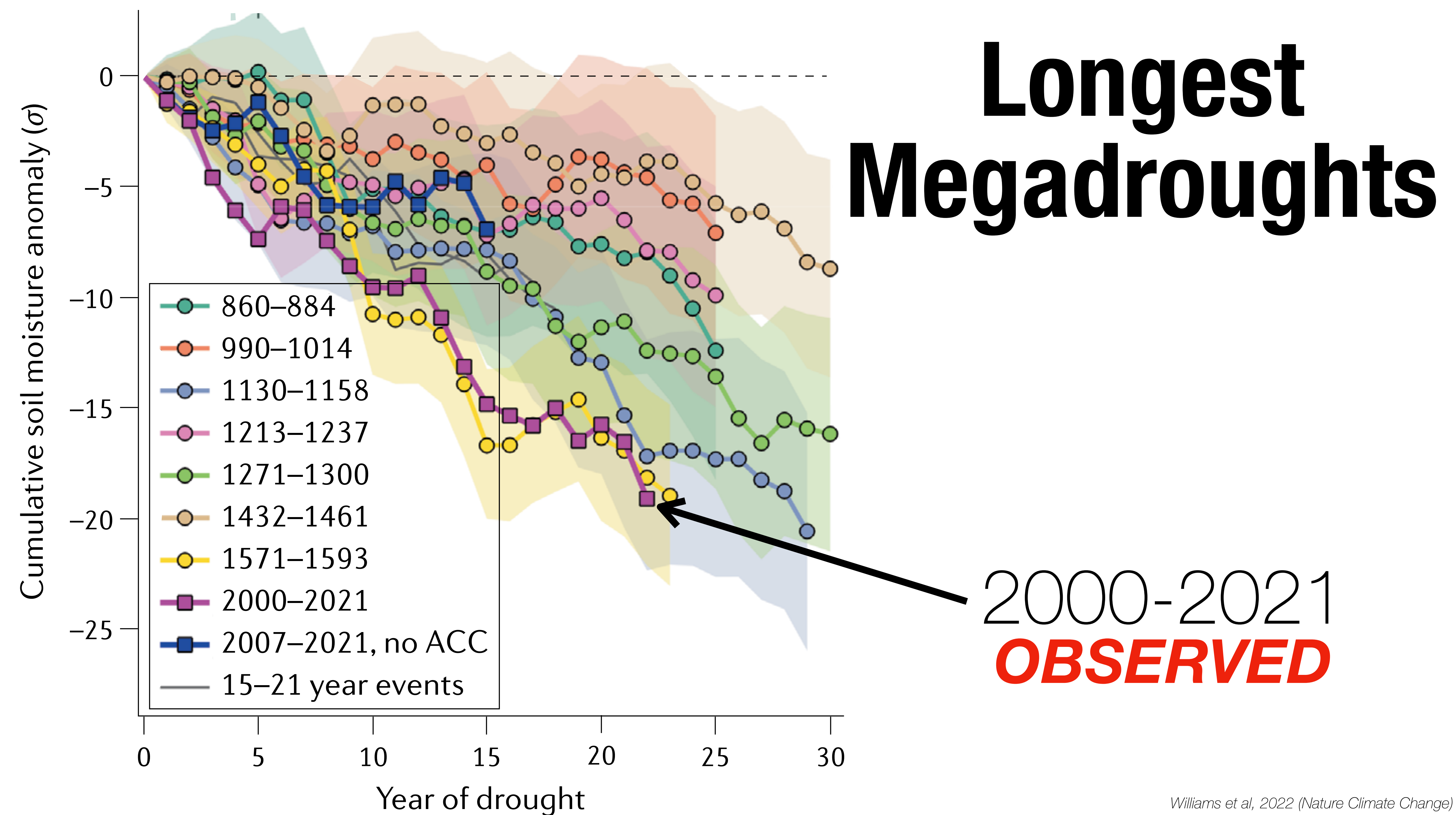
MEGAPLUVIALS



*ONE event
in 300 years*

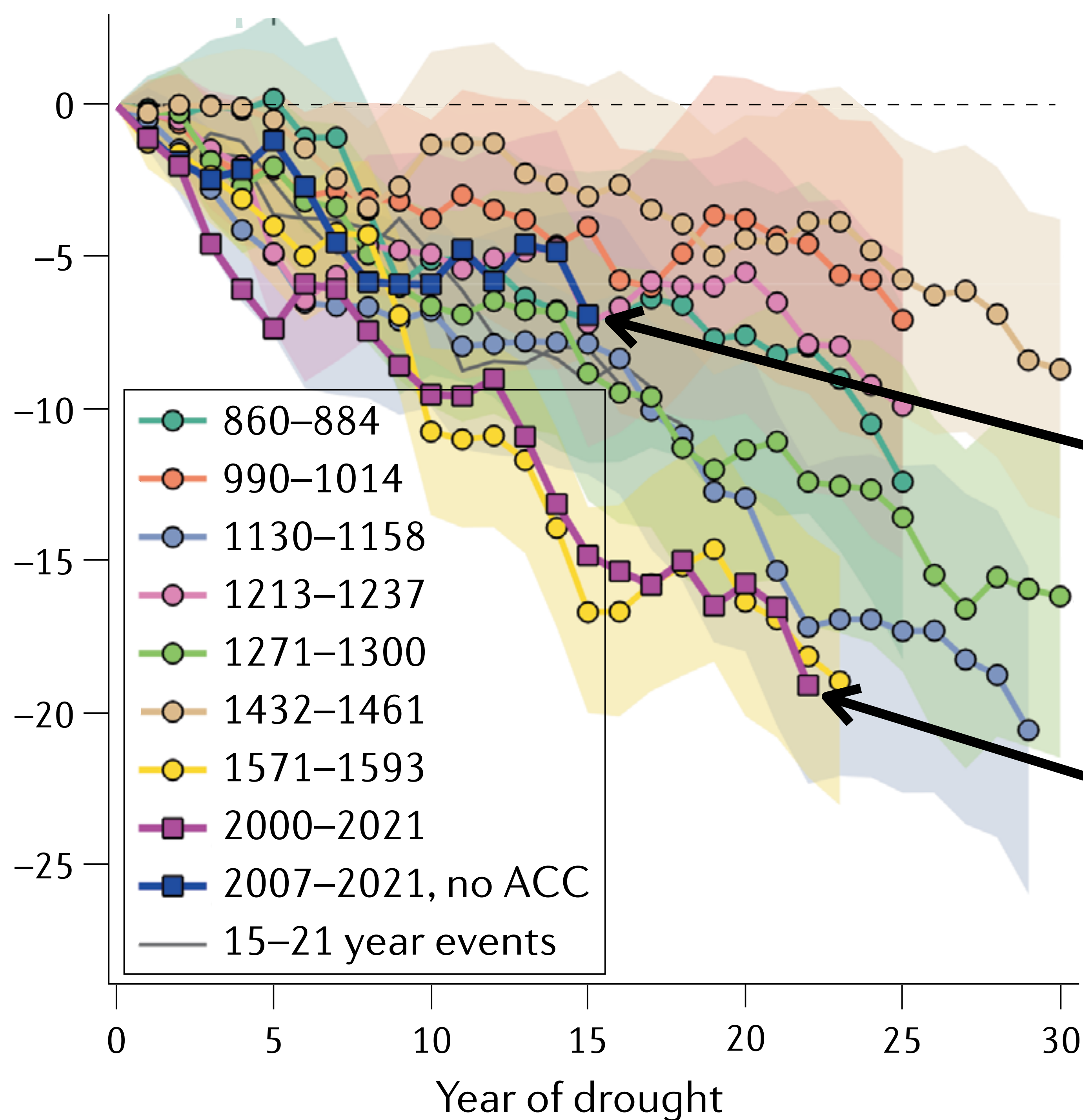
*TWO in the
20th Century*

Longest Megadroughts



Longest Megadroughts

Cumulative soil moisture anomaly (σ)

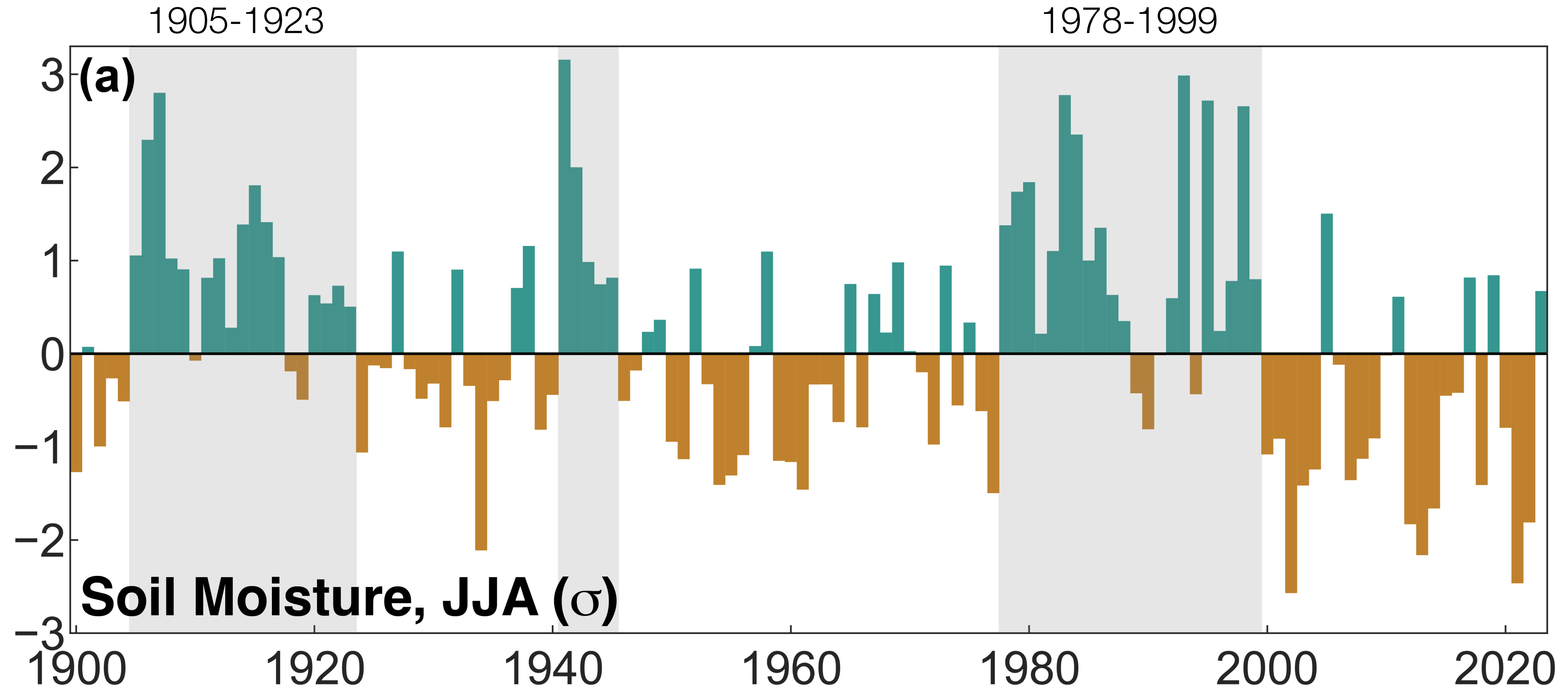


2007–2021
NO ACC

2000–2021
OBSERVED

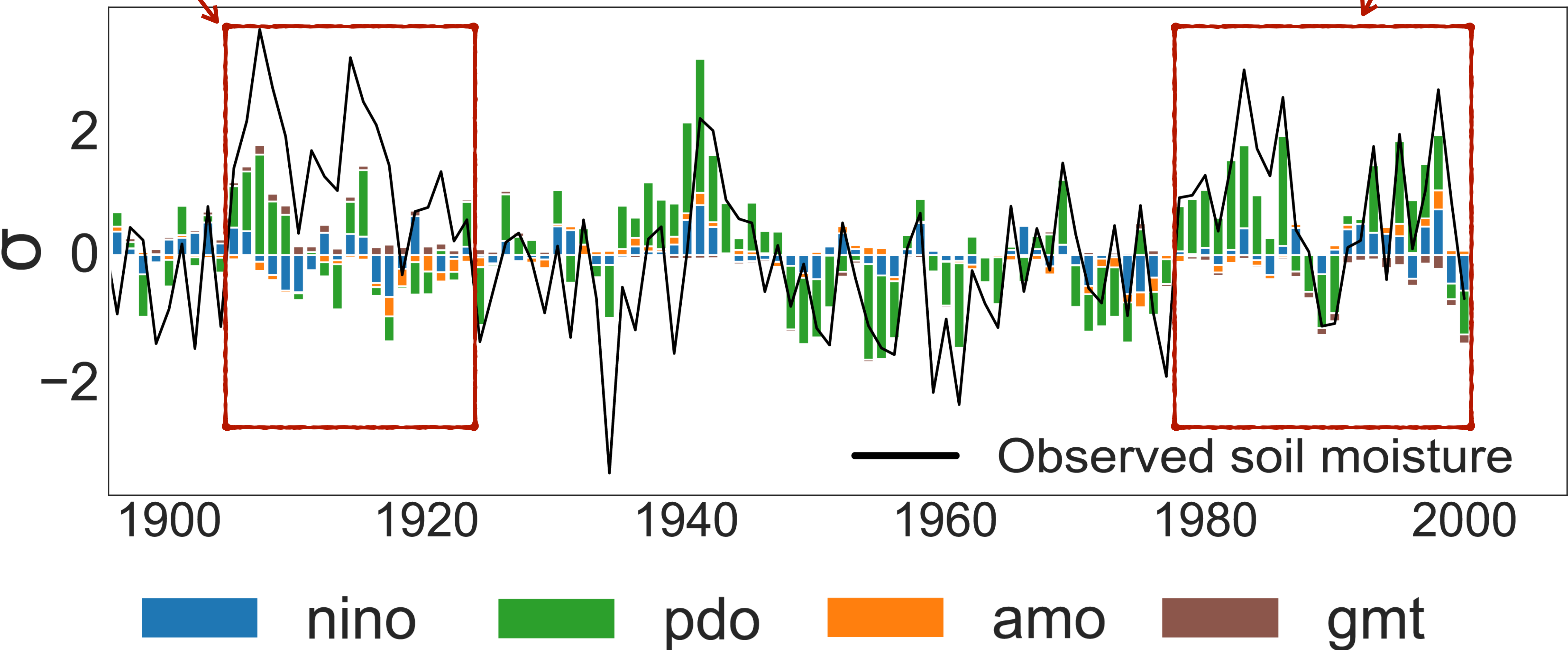
Twentieth-Century Pluvials

Southwestern North America

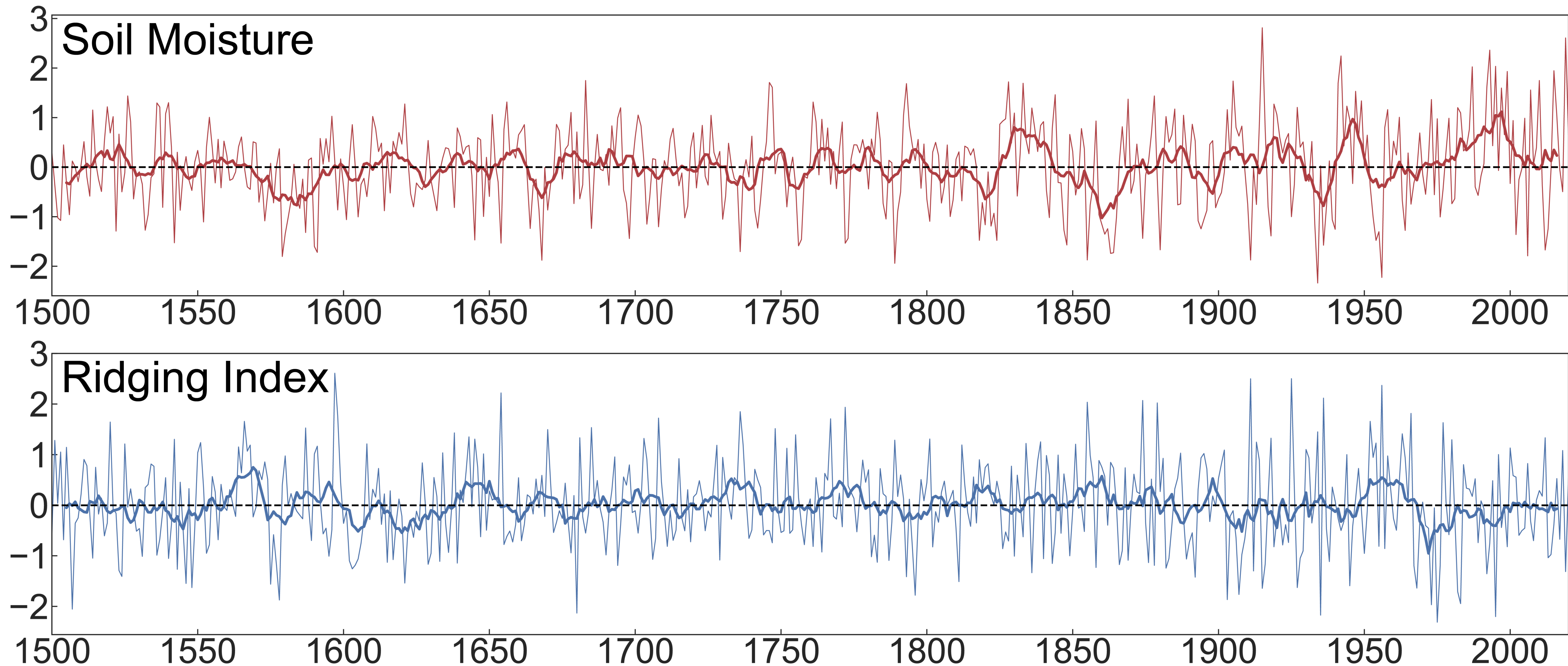


*Weak Ocean
Forcing*

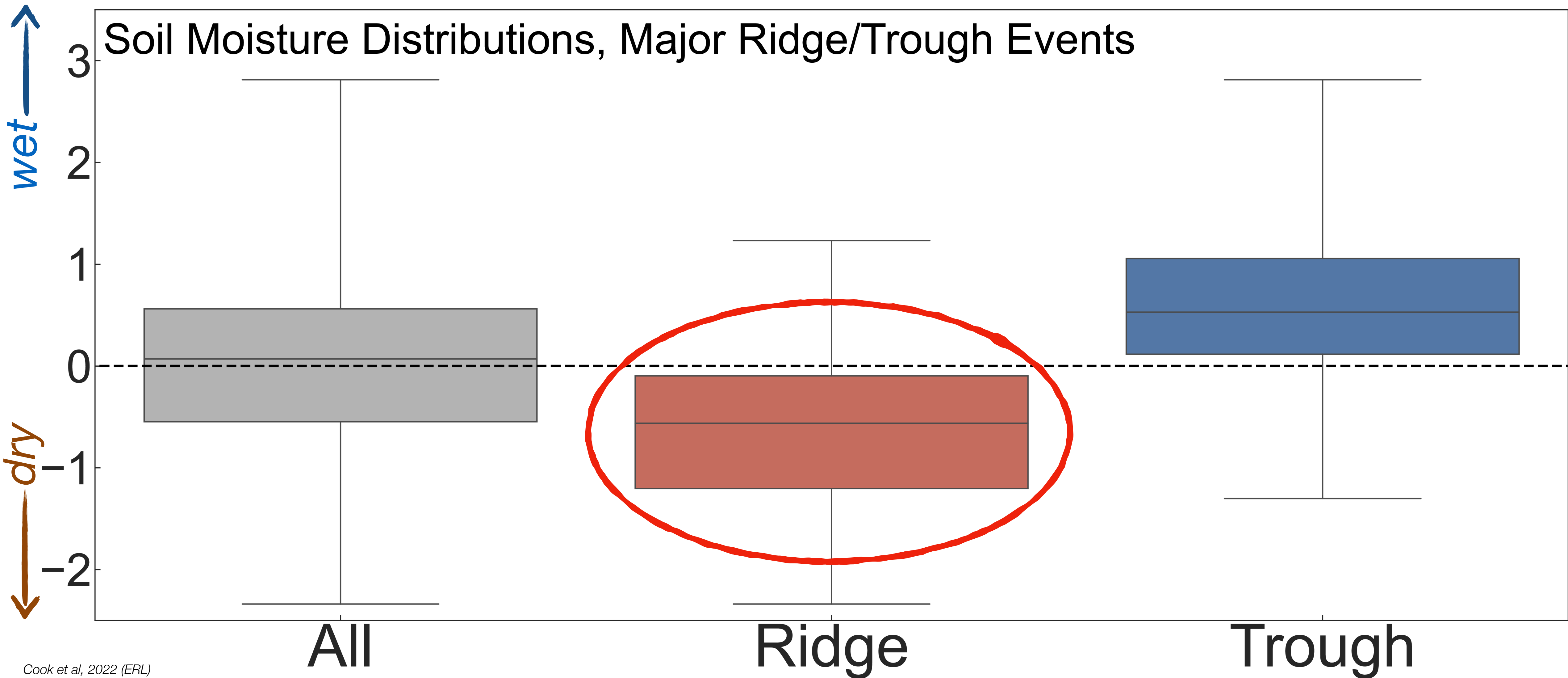
*Pacific Decadal
Variability*



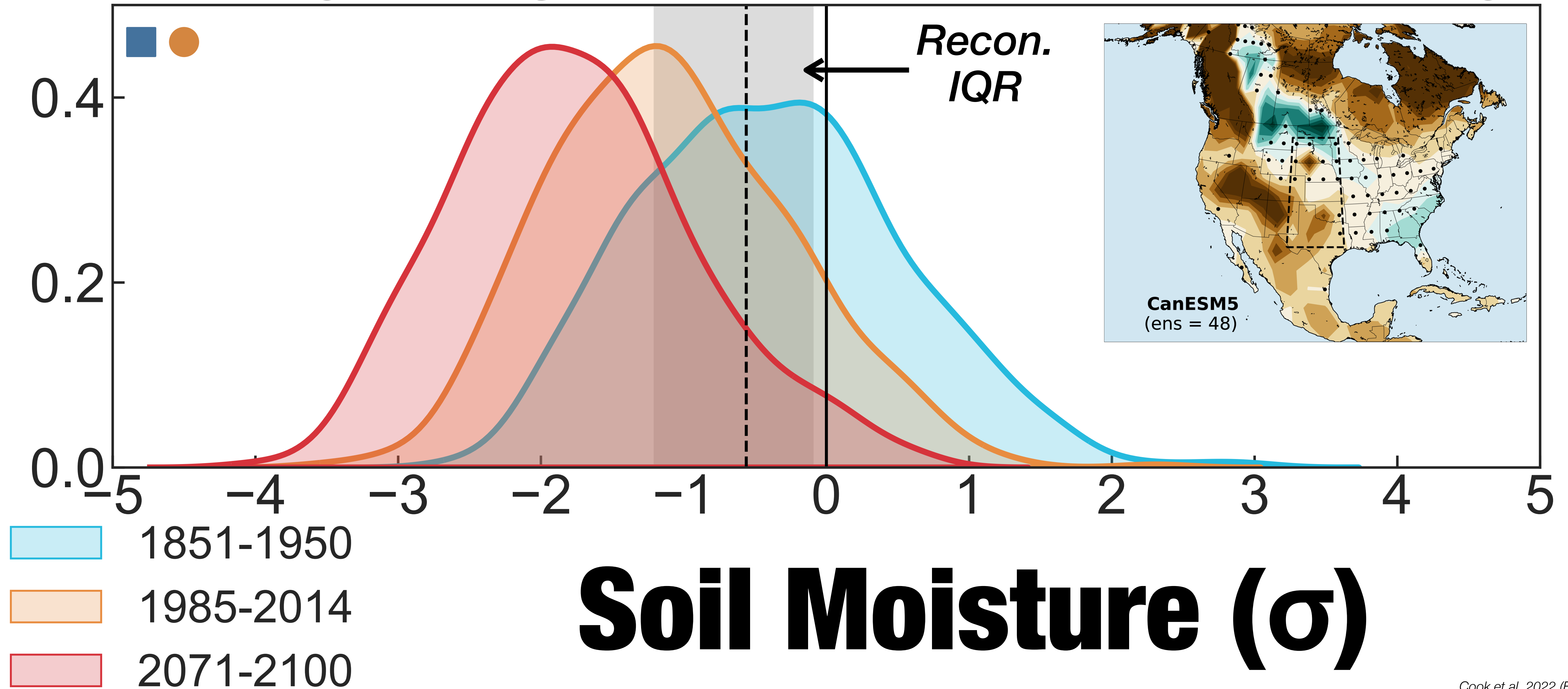
Ridging and Soil Moisture Drought Over the Central Plains



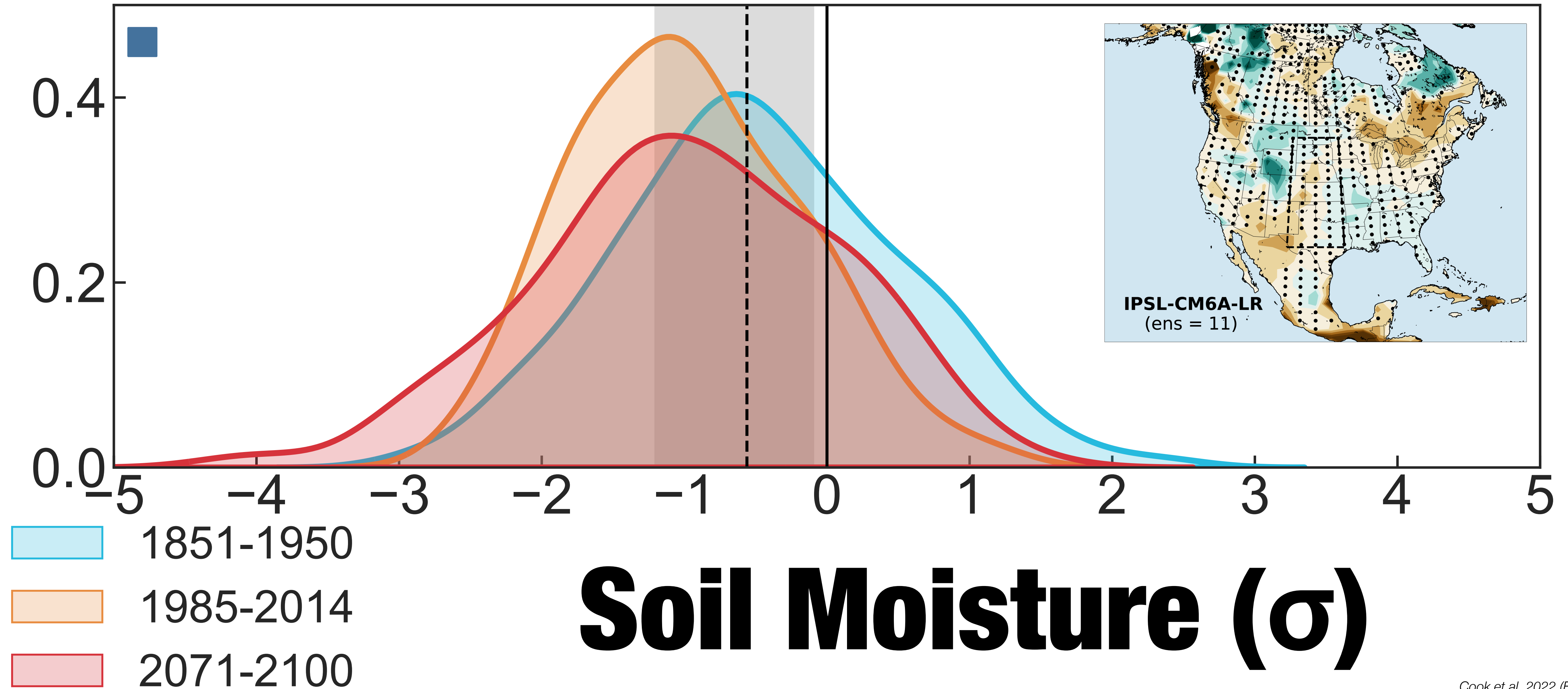
May-June-July, 500 years



*BUT significantly **drier soils**
during ridge events w/ warming*



Including models with no mean state drying



Non-stationarity in the paleoclimate record
occurs across a variety of timescales

There is non-stationarity in hydroclimate
variability, but also in underlying *processes*

Earth system models can provide important
complementary information on processes