

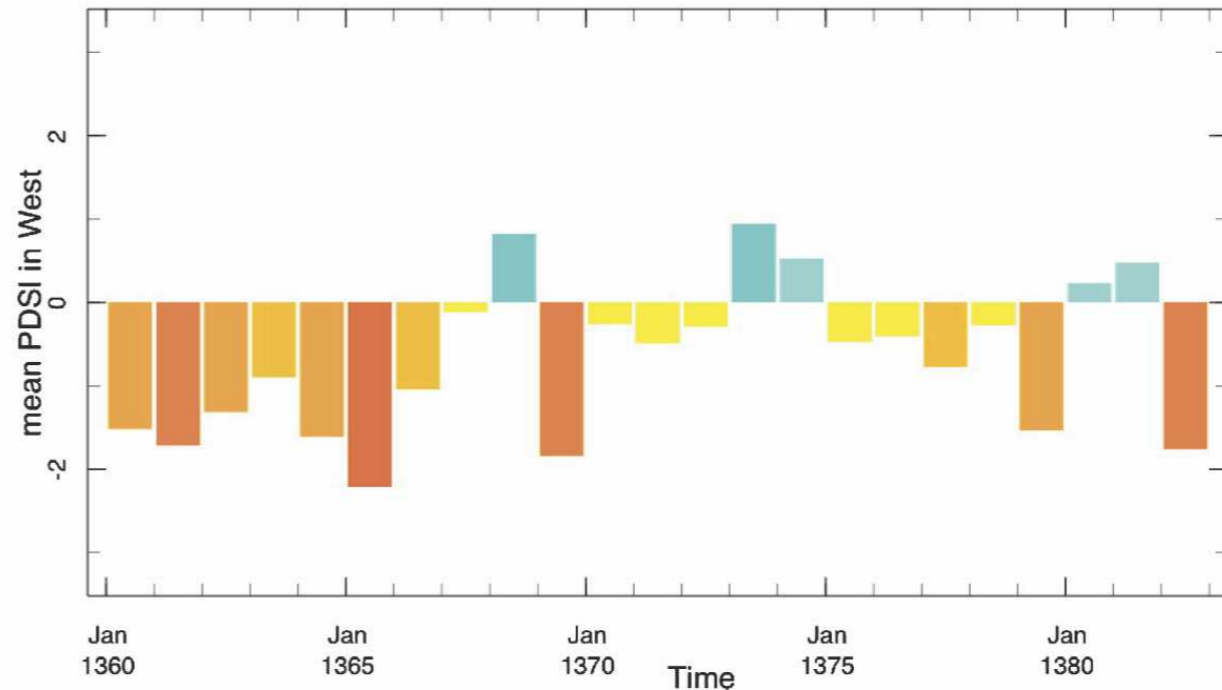
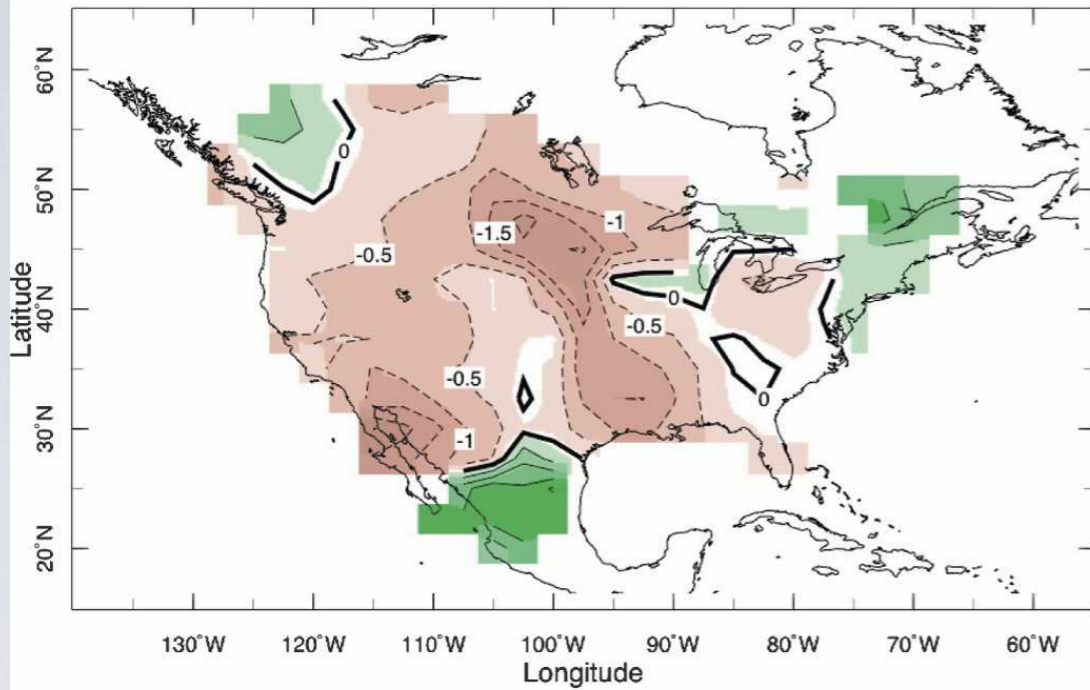
# **Stochastically Generated North American Megadroughts**

**Sam Stevenson  
University of Hawaii**

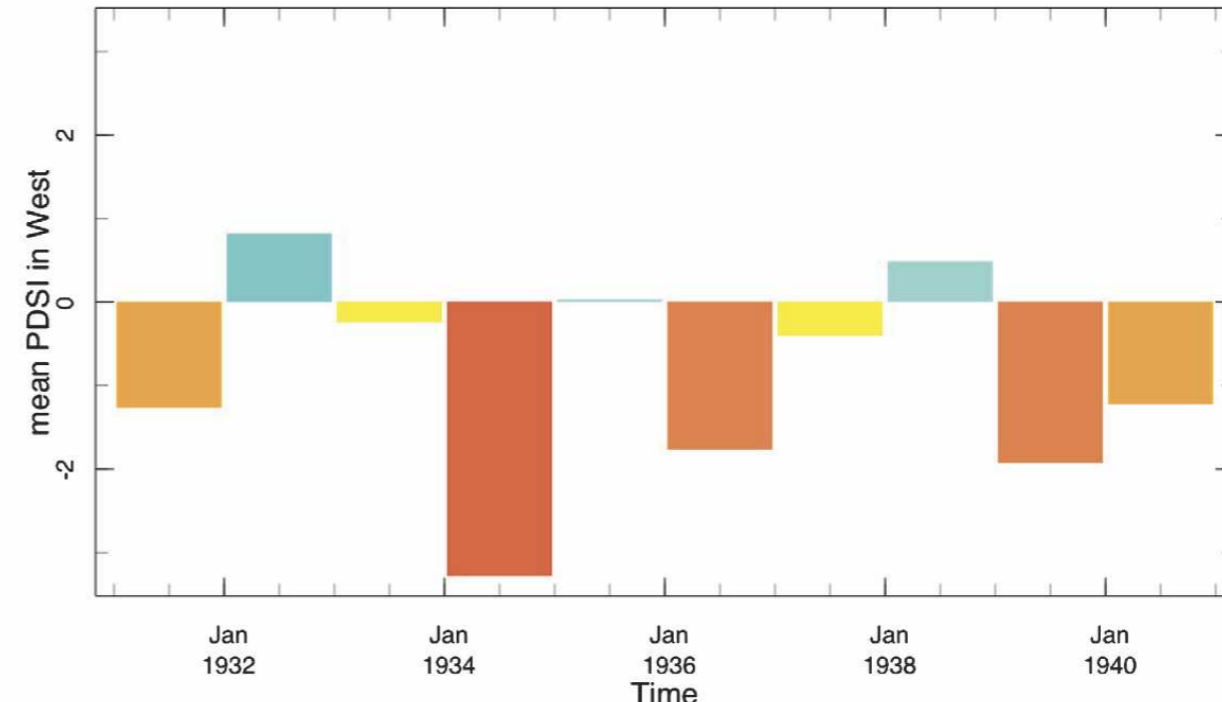
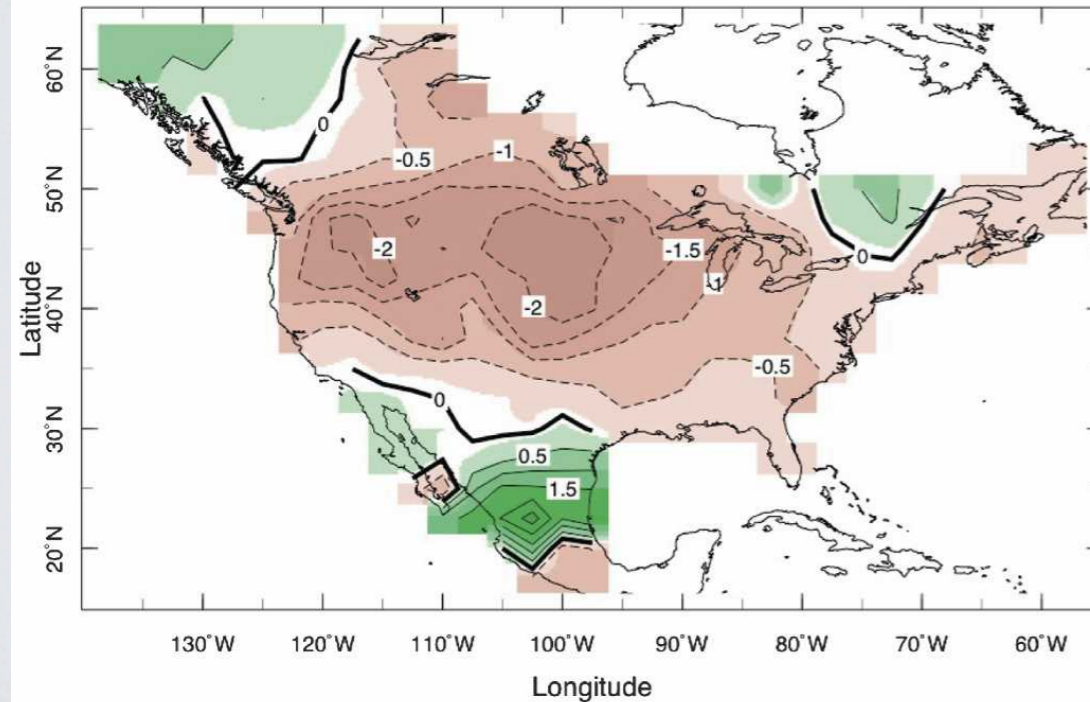


# “Megadroughts”: extreme events in the proxy record

## AD 1360-1382



## AD 1931-1940

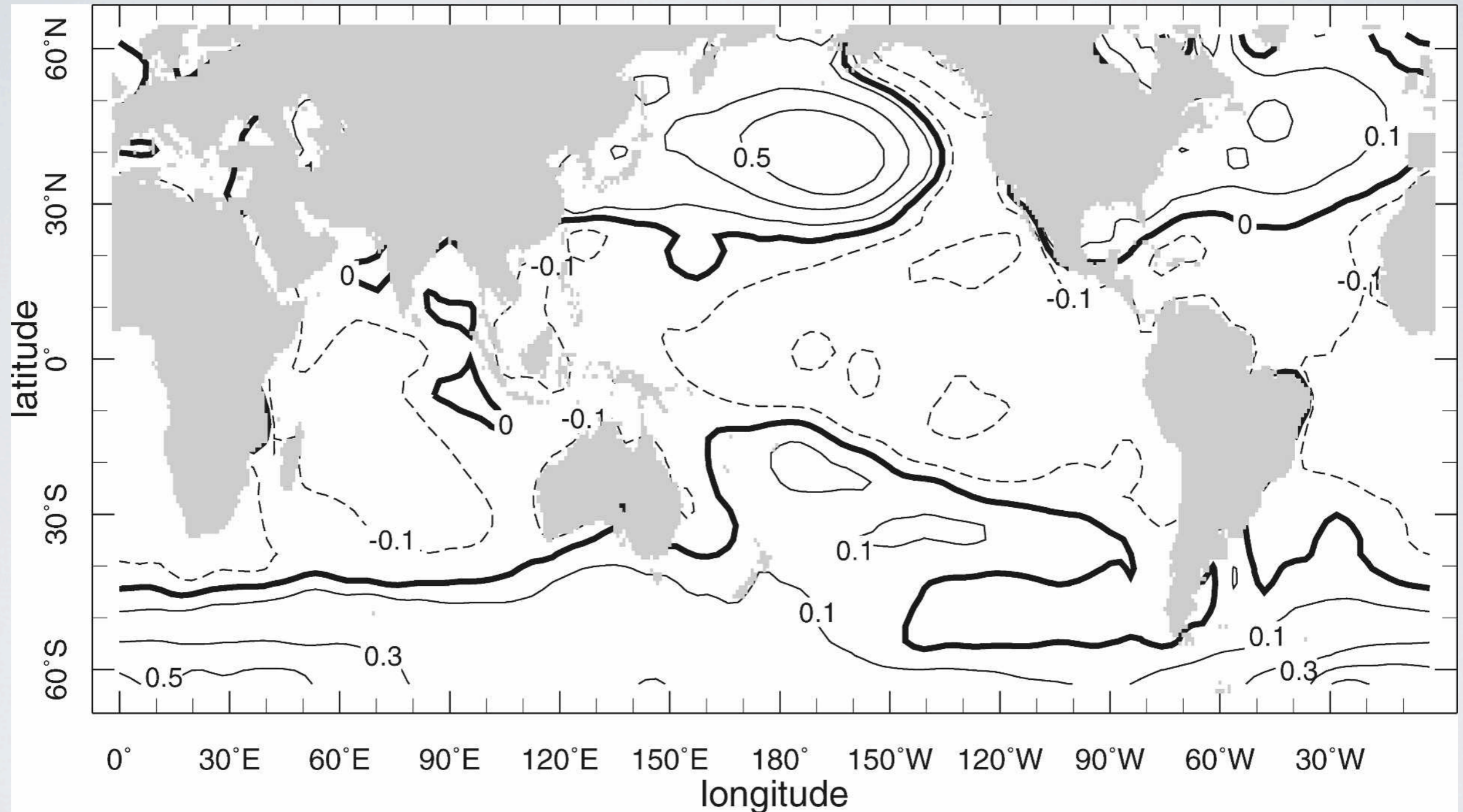


Herweijer et al. (2008)

Palmer Drought Severity Index (PDSI) anomalies for drought events  
Data from North American Drought Atlas (NADA; Cook et al. 2004)

# Megadrought “conventional wisdom”: blame it on La Niña

Seager et al. (2008)



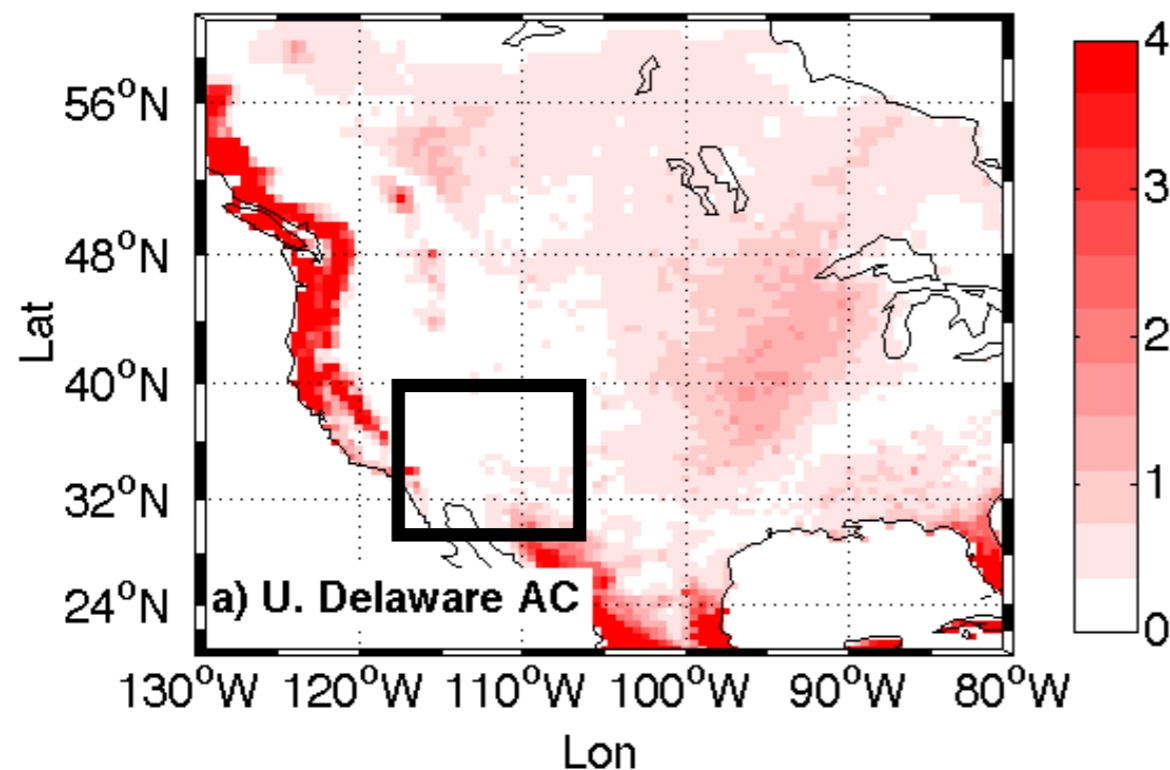
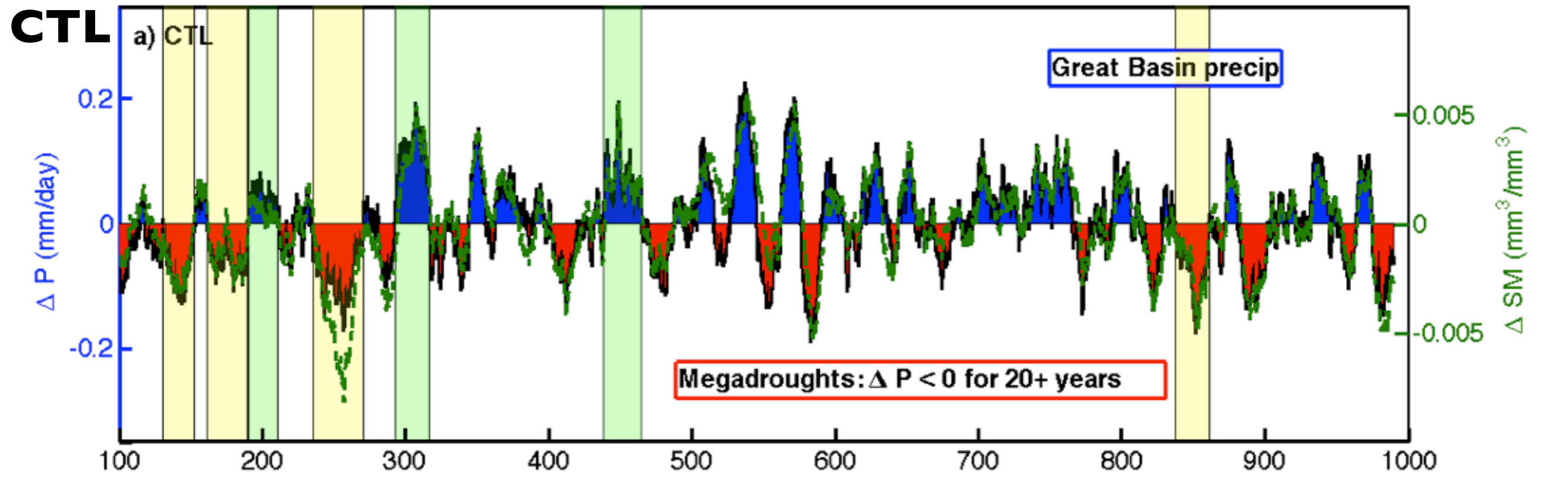
SST reconstructed from Palmyra coral:  
(1360-1400)-(1886-1998)



## **NULL HYPOTHESIS**

**Can you get megadroughts from  
random atmospheric noise,  
without relying on ENSO?**

# Megadroughts/pluvials: 1000yr CESM T3 1x3 PI control

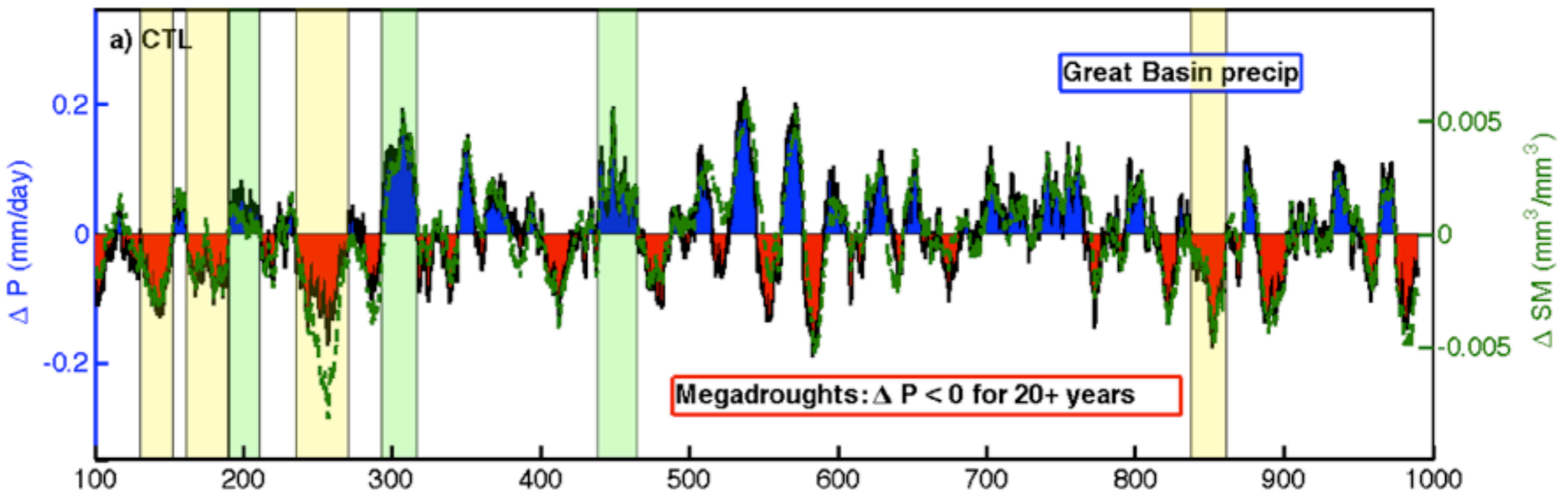


Great Basin: i.e. Meehl & Hu (2006)

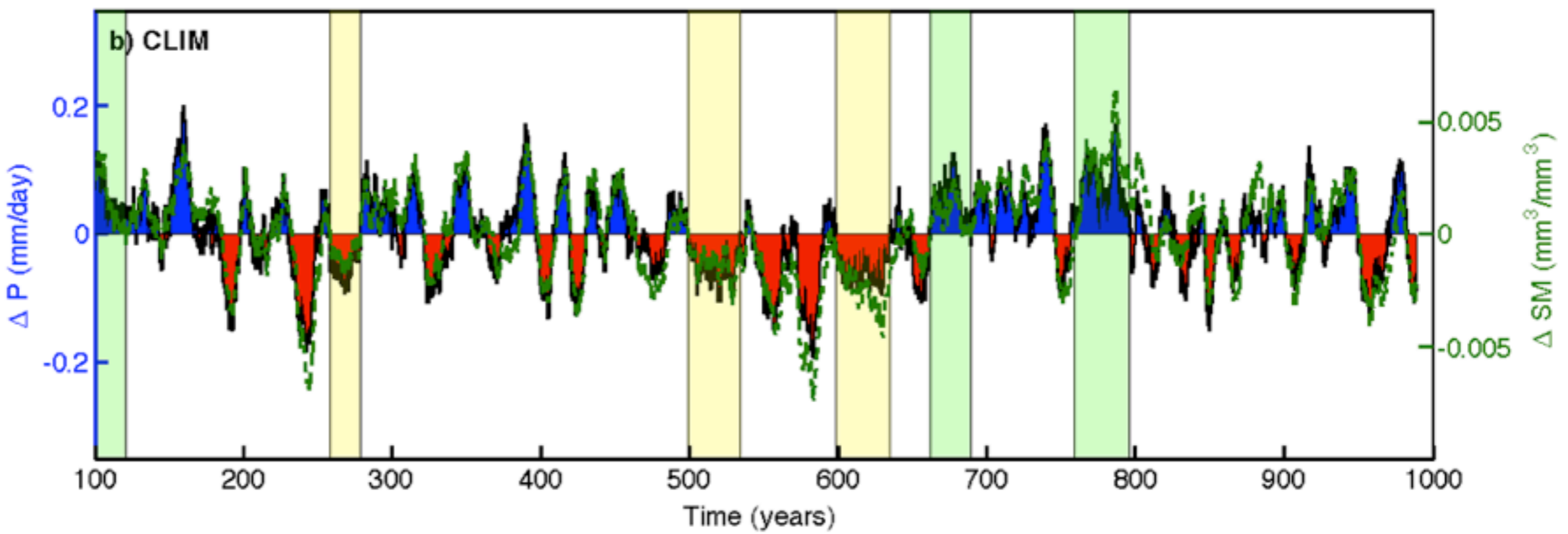
(Observed ann. cycle in precip)

# Megadroughts/pluvials **do** happen without the ocean

**CTL:  
fully  
coupled**

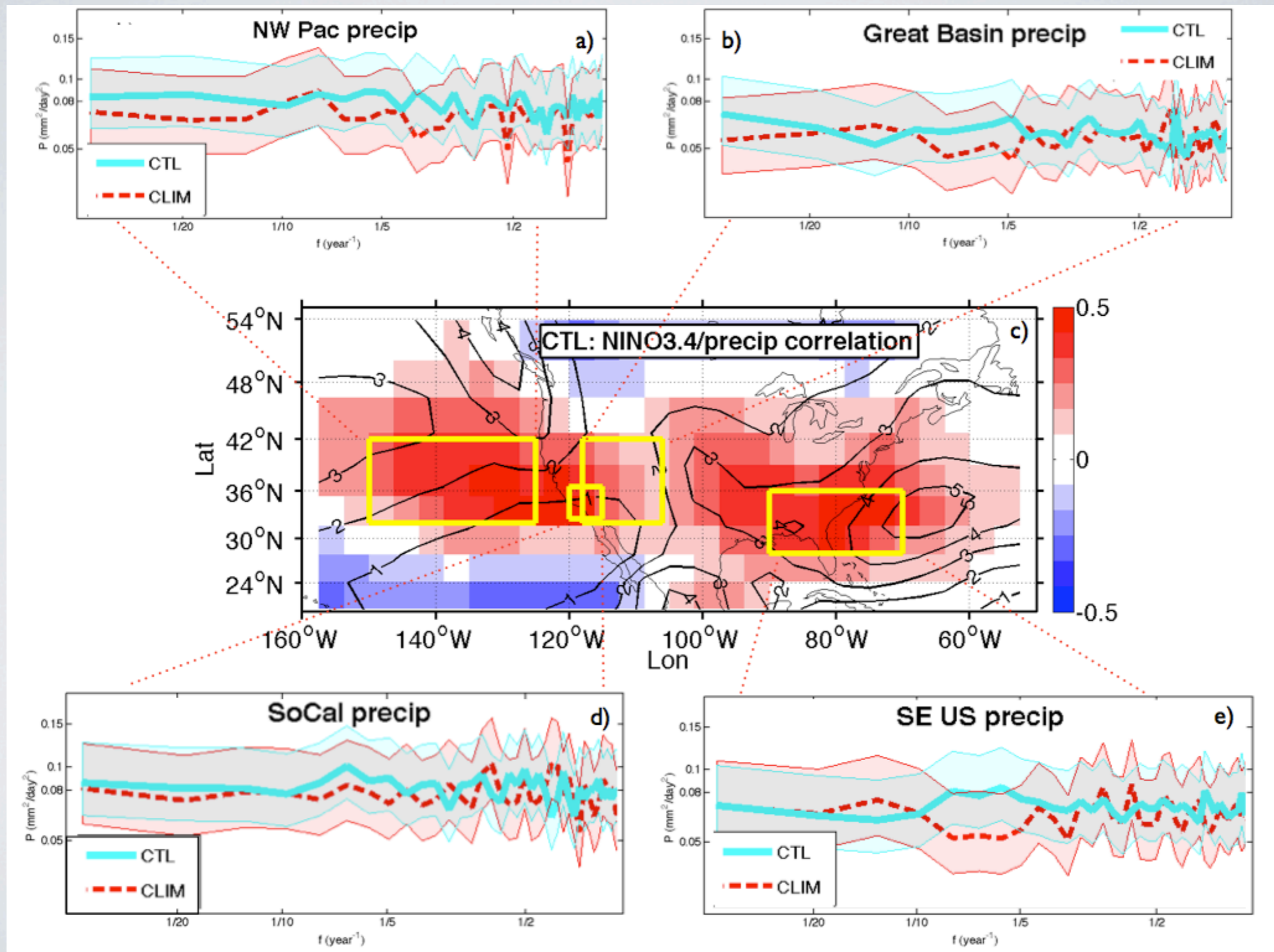


**CLIM:  
CAM4  
w.  
SST  
ann.  
cycle**

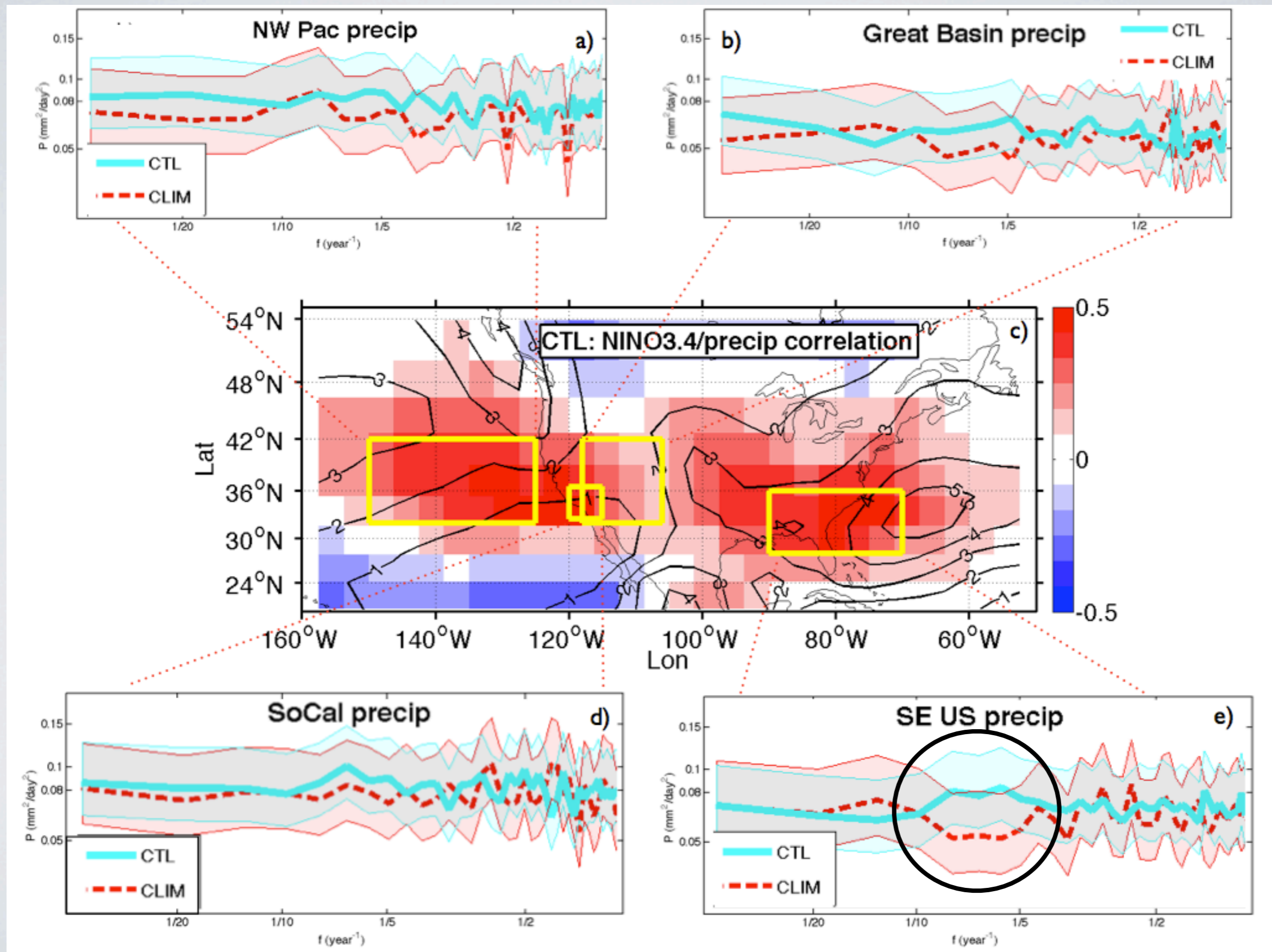




# Results are robust to choice of region

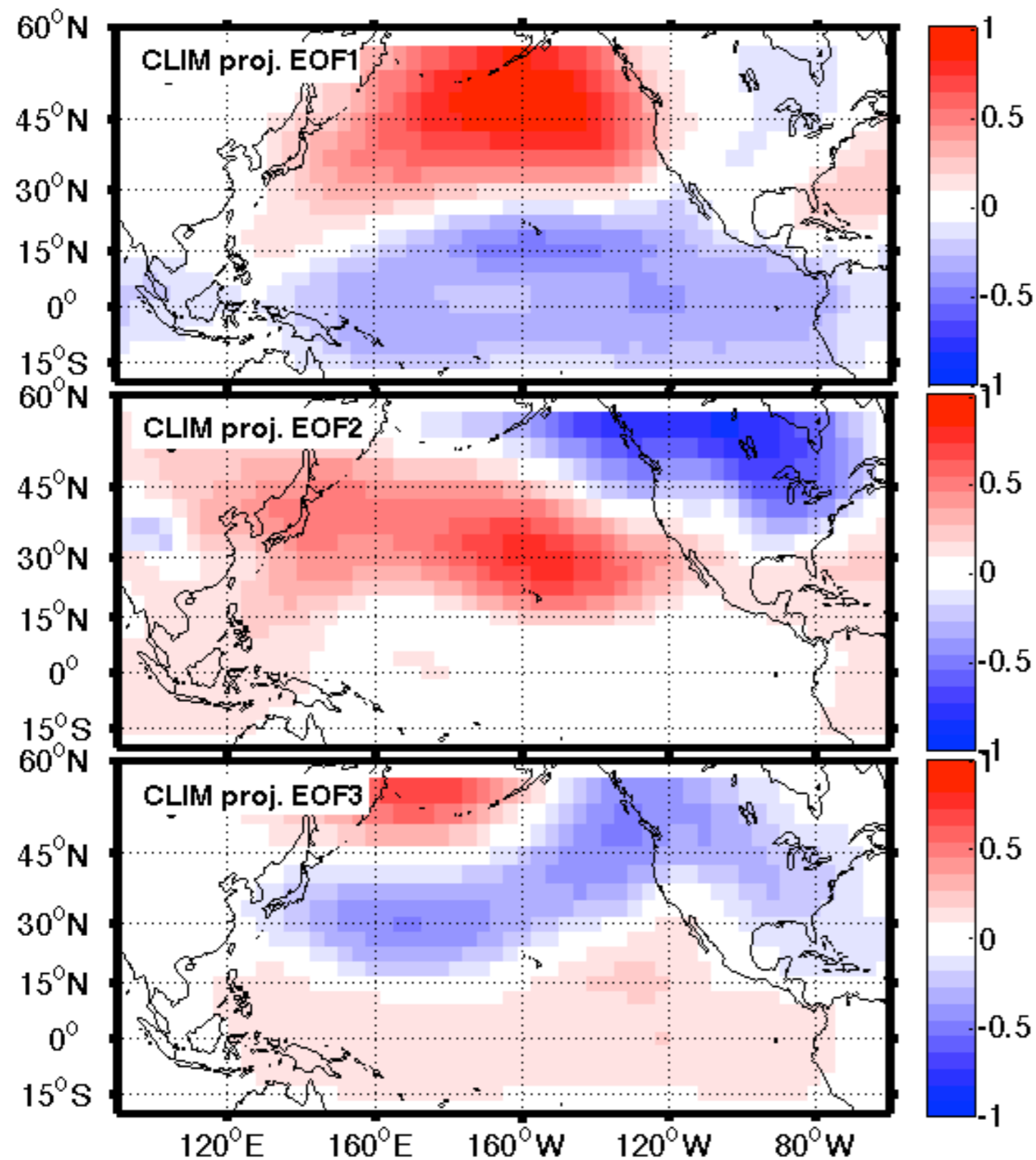


# Results are robust to choice of region





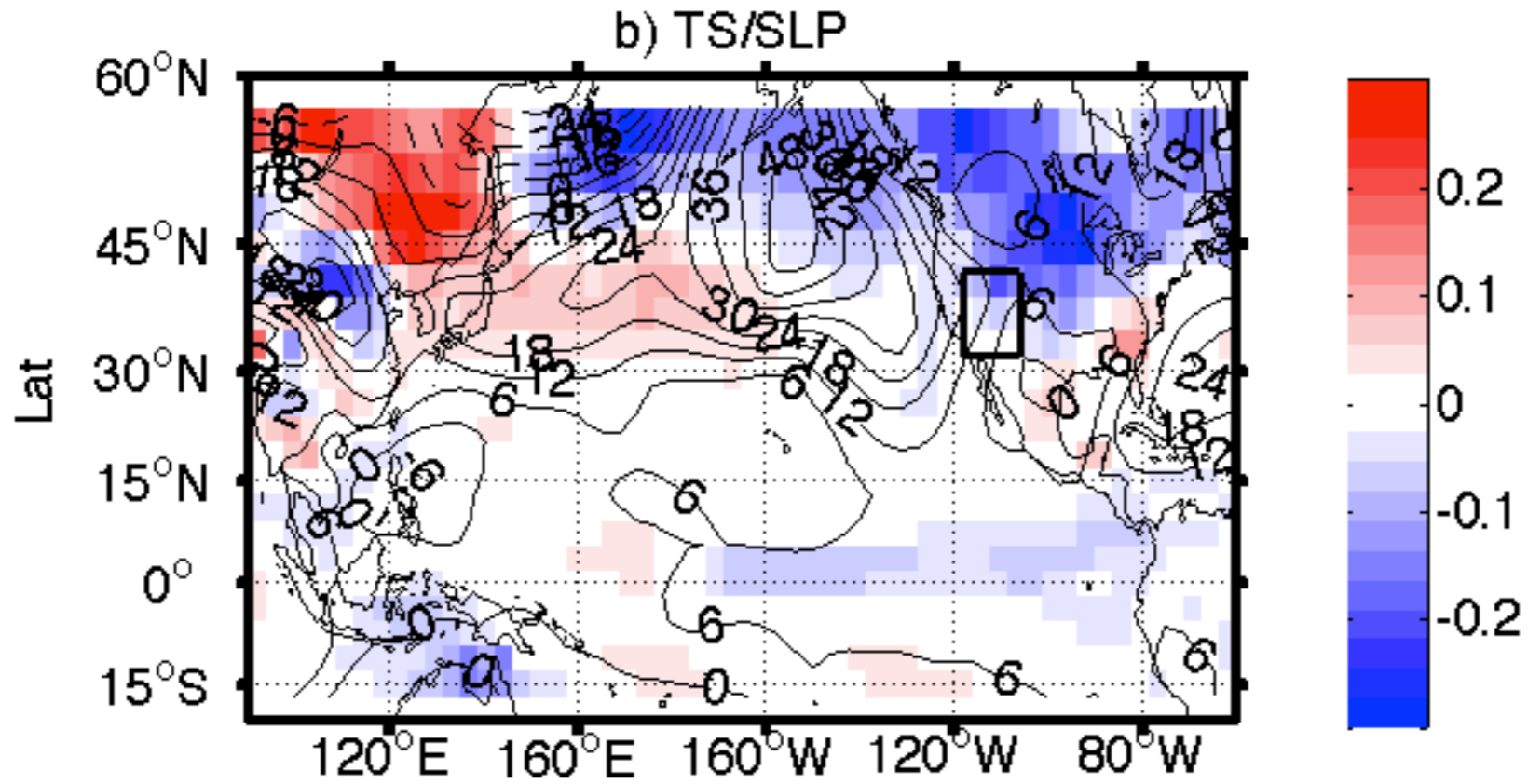
# Cannot rule out chaotic midlatitude circulation “null hypothesis”



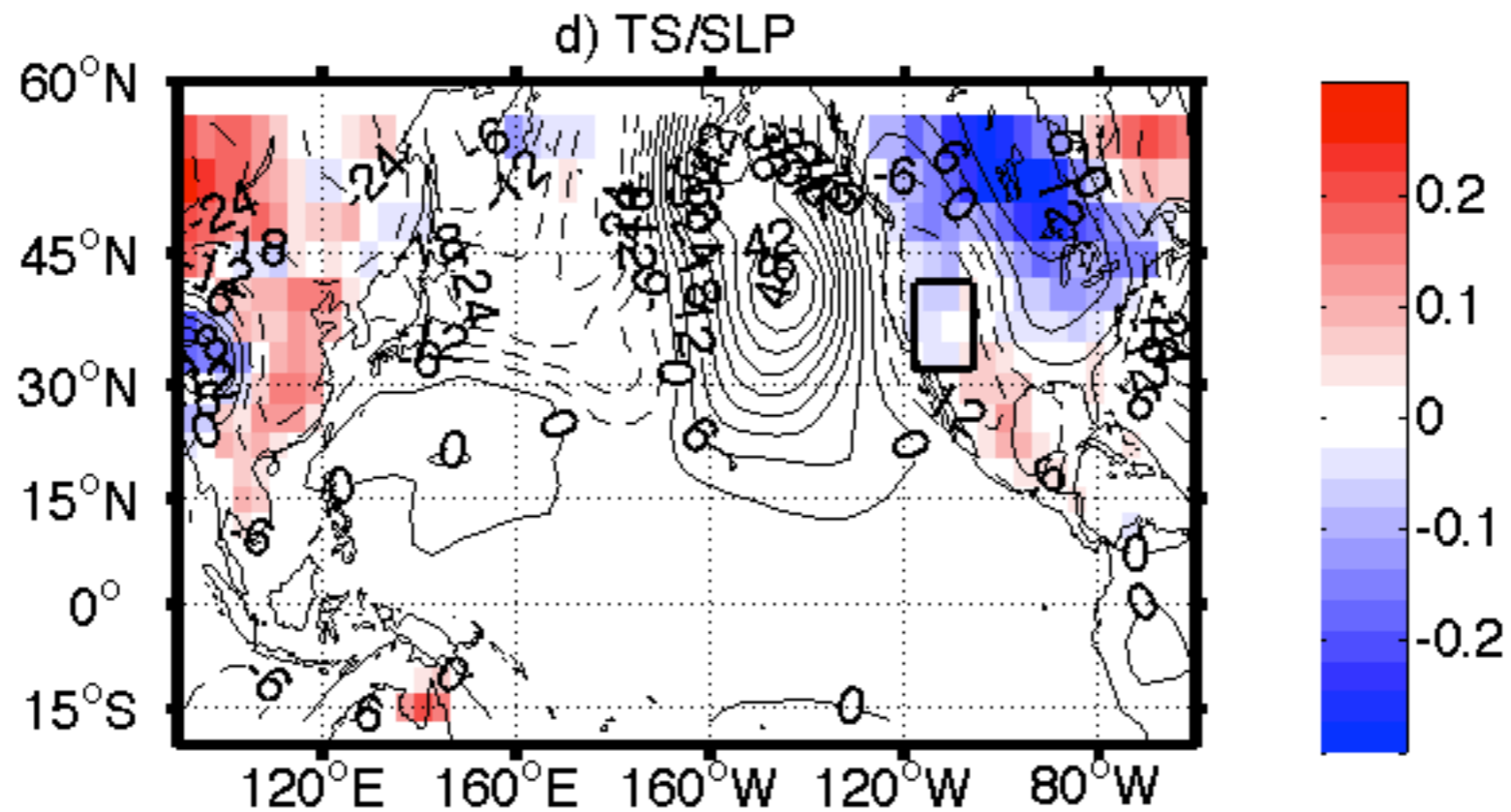
Dominant SLP modes show mixture of signatures from PNA/NPO/other influences:  
*CTL, CLIM modes identical*

# Circulation during megadroughts differs in CTL, CLIM

**CTL**



**CLIM**



**(DJF anomalies)**



# Main conclusions

Events that look like megadroughts can occur with no ocean coupling.

Overall precip variability shows little ENSO signal... except possibly in the SE US.

Land/atmosphere coupling could be important; more work is needed to see whether land or ocean forcing matters more.

**For more details... see Sally Langford's poster!**  
**CVC-6**