Future Changes in the Relationship Between Tropical Cyclones and ENSO

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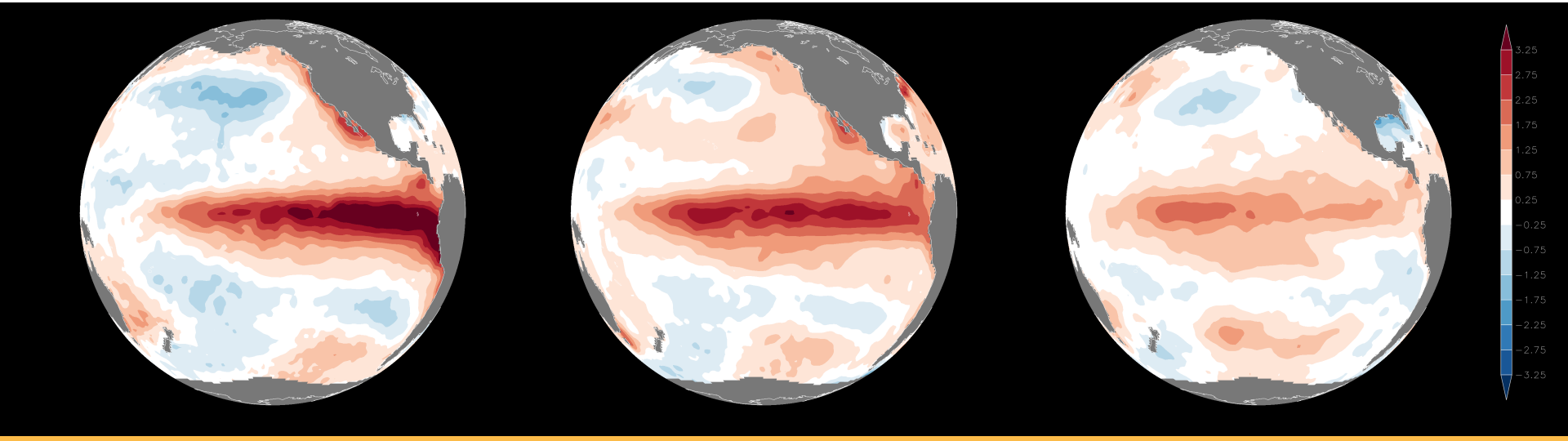
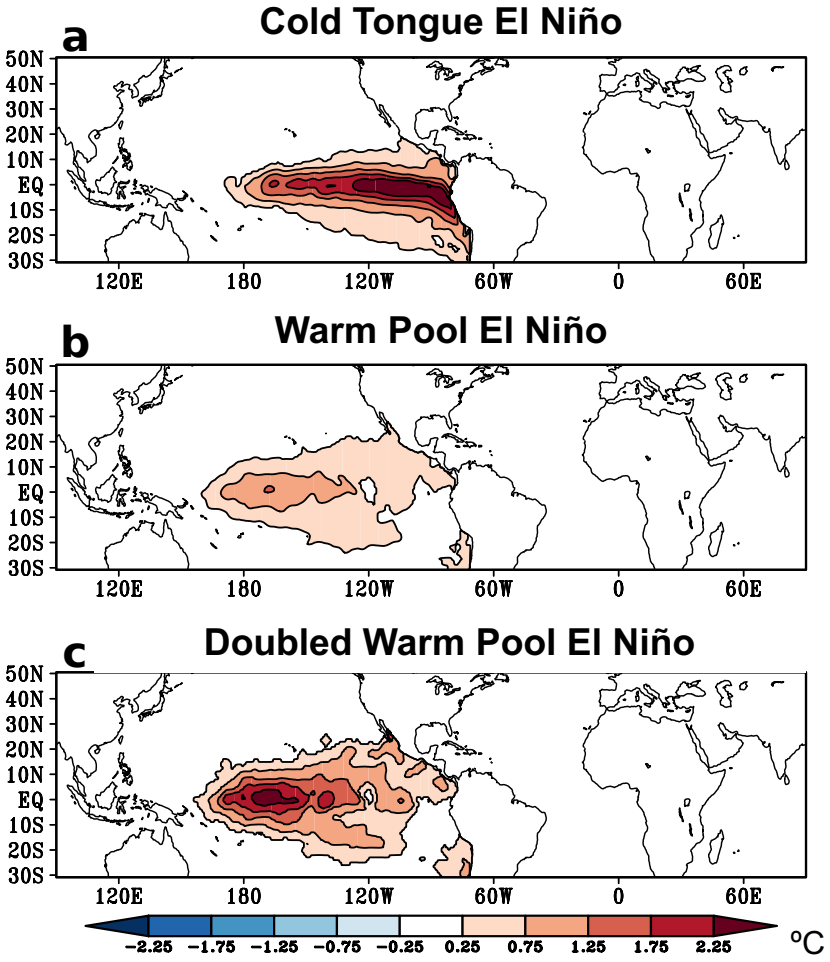
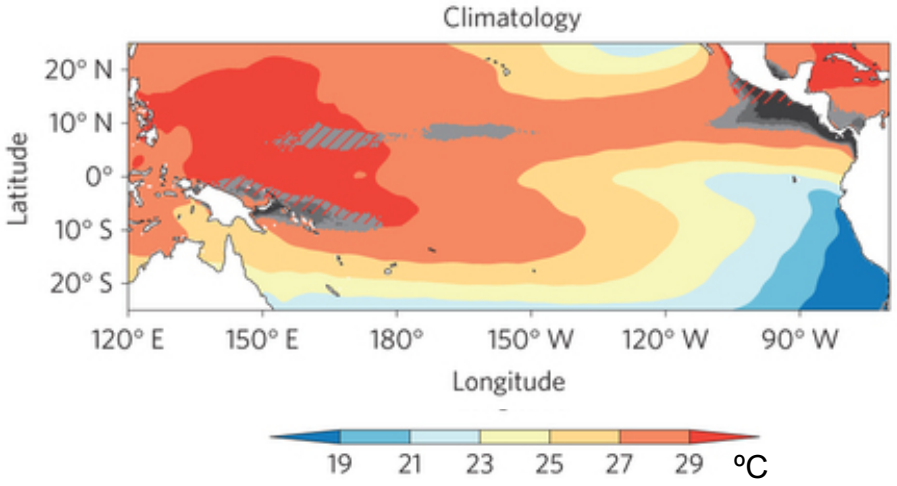


RGMA PI Meeting | Coastal system land-atmosphere-ocean interactions breakout session | October 13, 2020

ENSO diversity



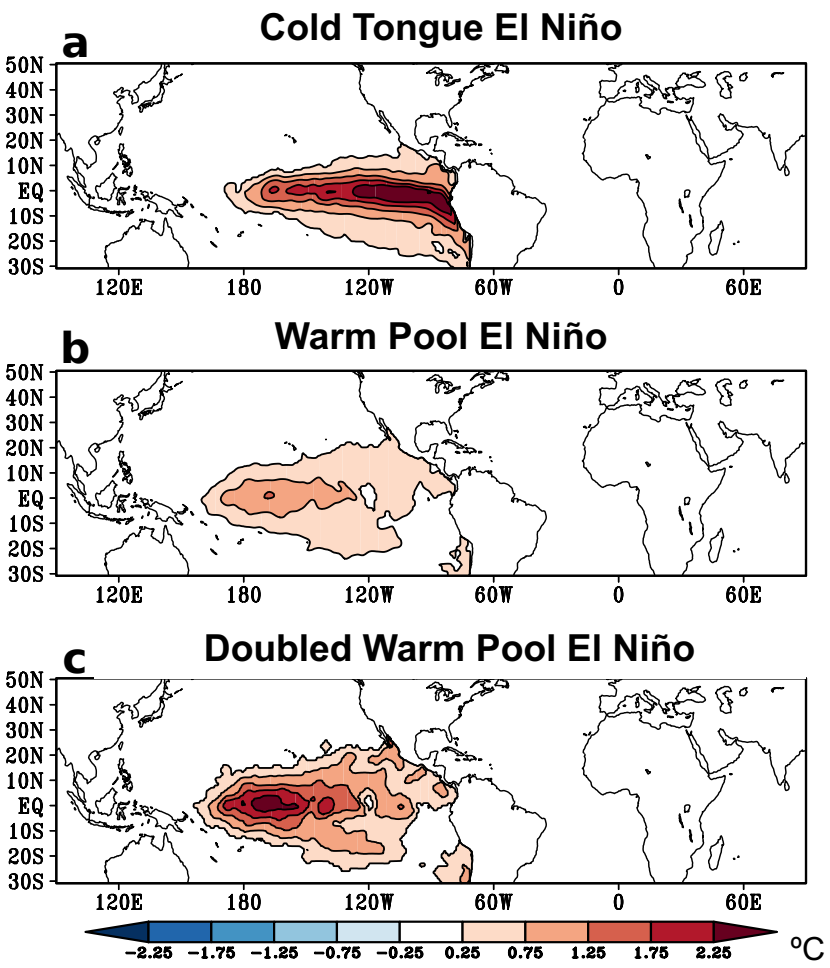
- El Niño is one major source of seasonal TC predictability.
- However, there is a diversity of El Nino warming patterns.

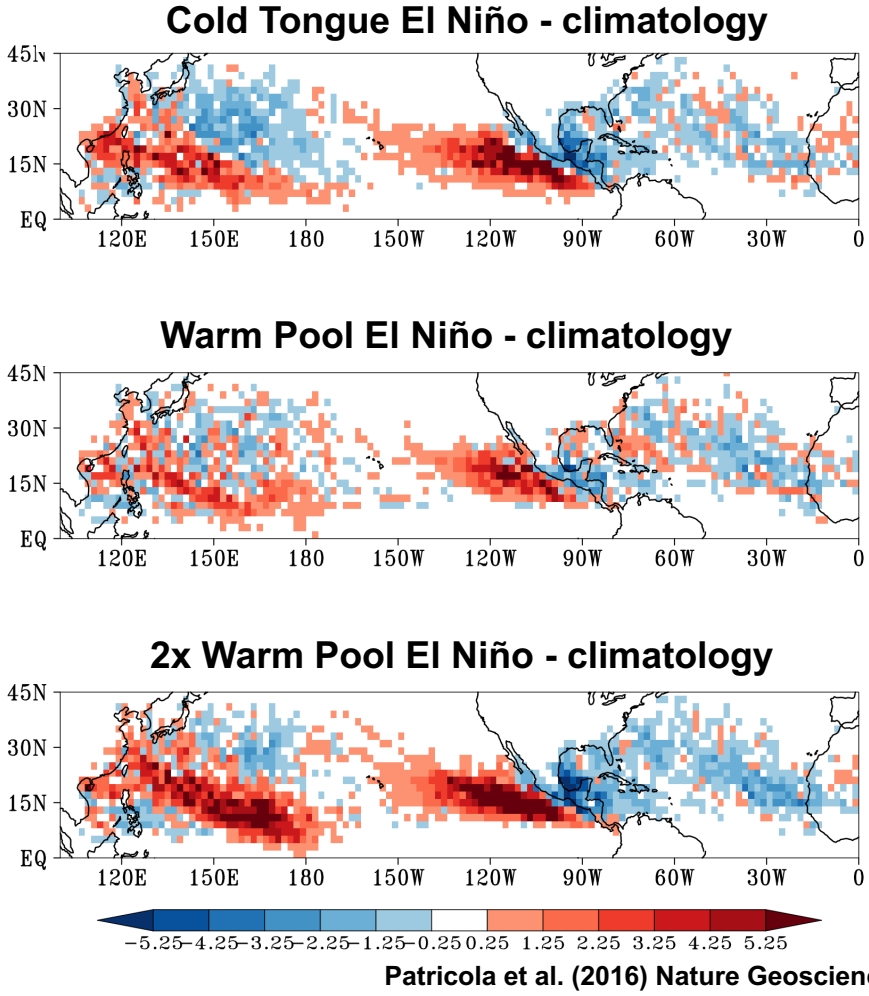


Patricola et al. (2016) Nature Geoscience

Tropical cyclone response to ENSO diversity

SST warming near the warm pool is more effective than warming of the cold tongue at suppressing Atlantic TC activity.





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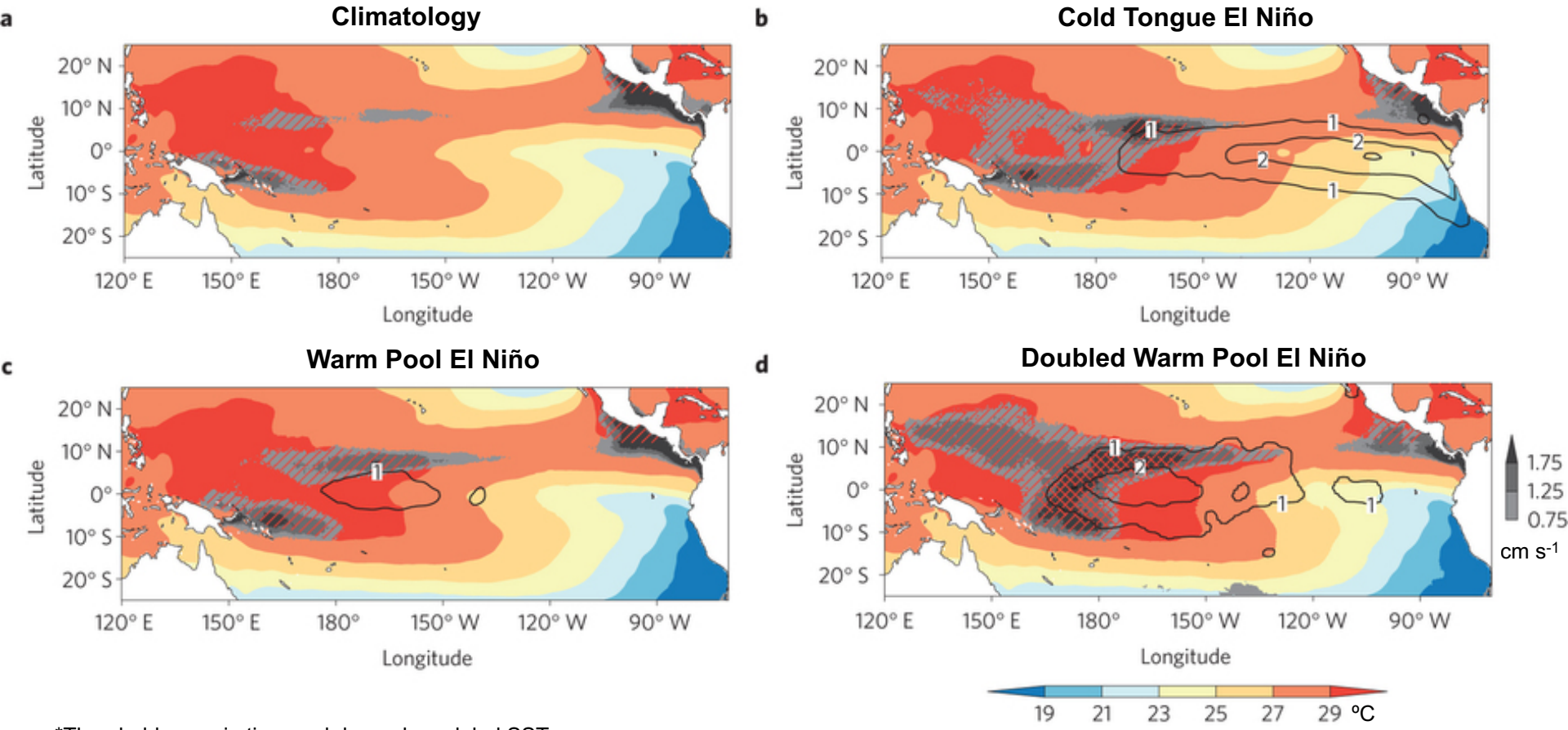
Absolute SST is more informative than SST anomalies

Less warming is required near the warm pool than the cold tongue to satisfy the SST threshold* for deep convection.

Simulated deep convection and prescribed SST and SST anomalies (Aug-Oct)



*Thresholds vary in time and depend on global SST.
(Williams and Pierrehumbert 2009; Johnson and Xie 2010)

Patricola et al. (2016) Nature Geoscience

Research underway

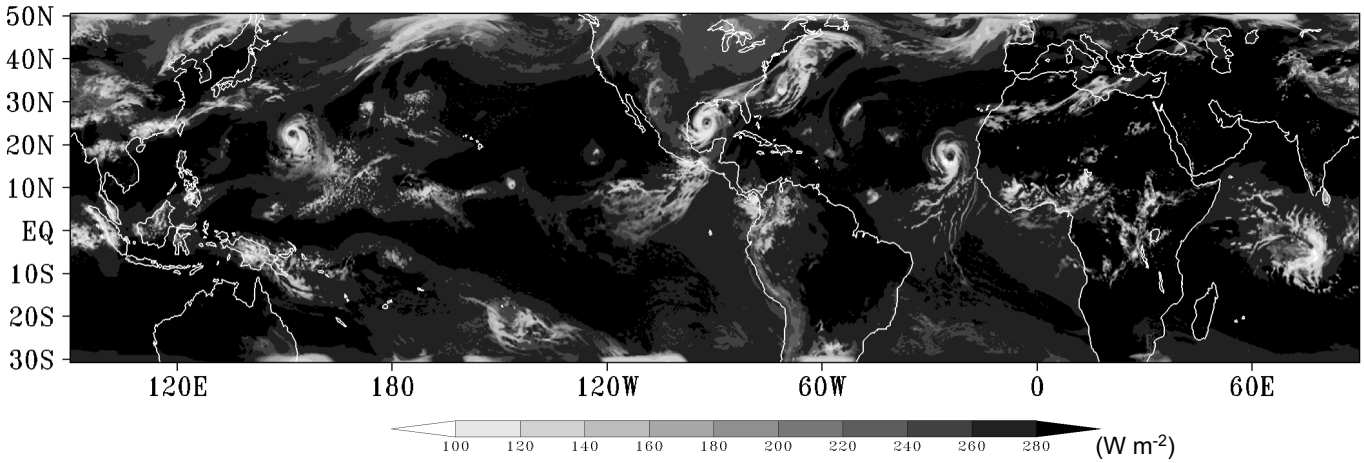
Question: How are changes in ENSO expected to influence future TC statistics and characteristics?

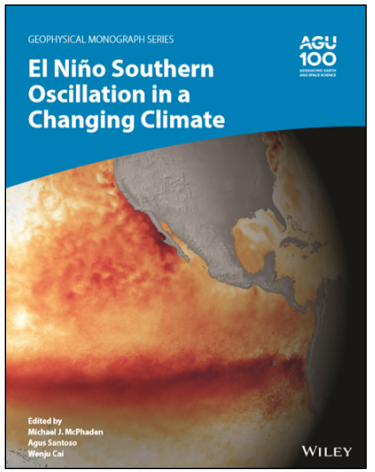
Hypothesis: Changes in ENSO can modulate the dynamic and thermodynamic TC environment, with non-linear TC responses.

Method: TC-permitting WRF tropical channel model.

Impact: Addresses a major gap identified by TC community.

Outgoing longwave radiation





Lin, Camargo, Patricola, et al. (2020)