

Summary

Precipitation over North America is more sensitive to shifts in the subtropical highs than to Hadley cell expansion

The subtropical highs are also more helpful for understanding changes to wind-driven ocean currents



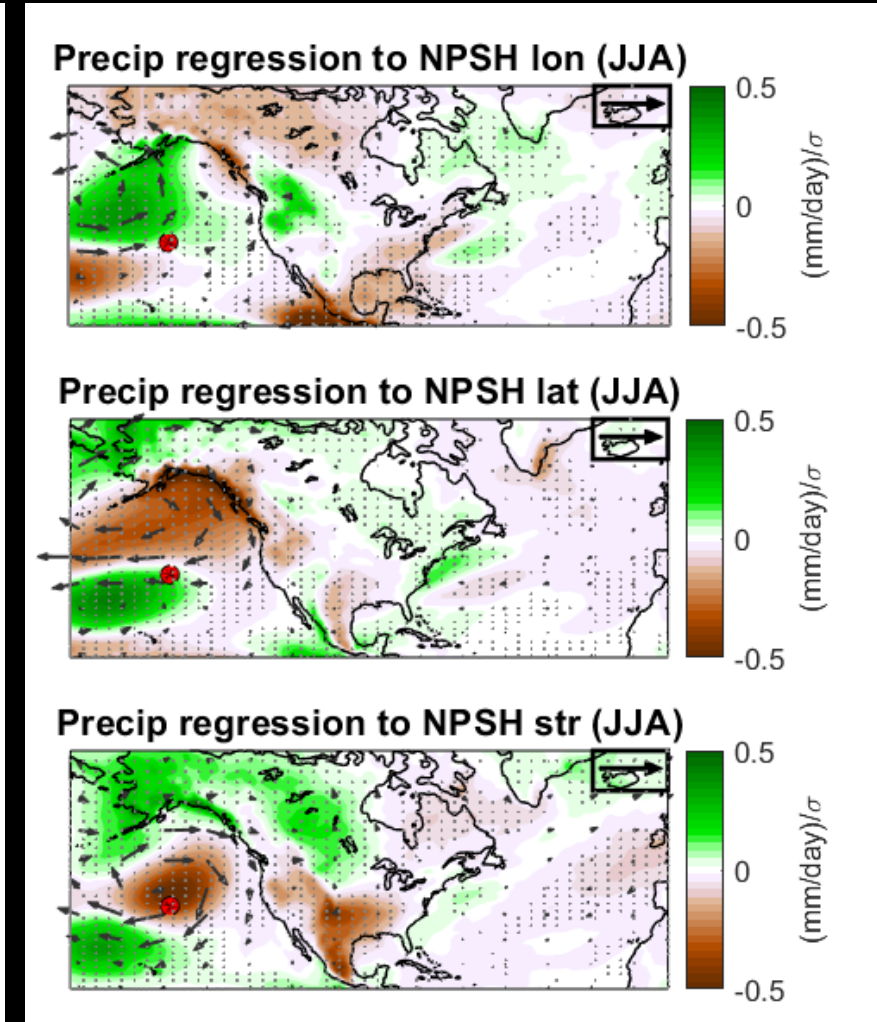
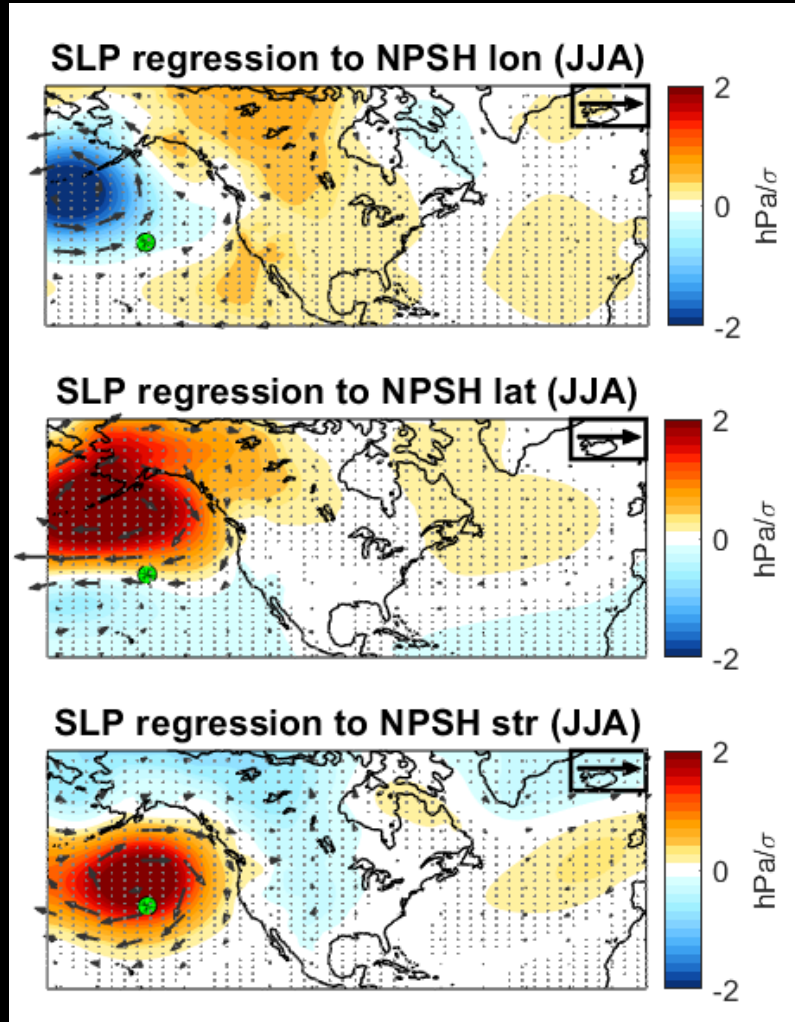
Portions of this work were previously published as:

Schmidt, D. & Grise, K. (2019), Impacts of Subtropical Highs on Summertime Precipitation in North America, *JGR: Atmospheres*, 124(21): 11188-11204. <https://doi.org/10.1029/2019JD031282>

North Pacific

The left panels show the sea-level pressure anomalies associated with changes in the longitude, latitude, and strength of the North Pacific high.

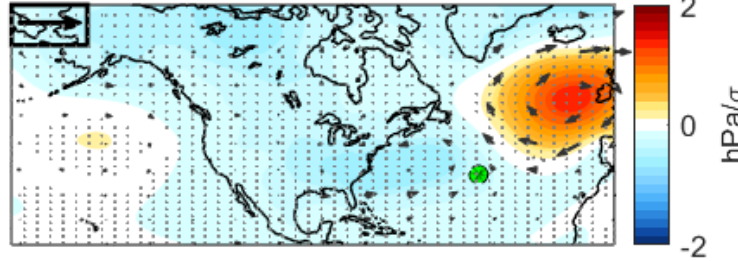
The right panels show the same for precipitation.



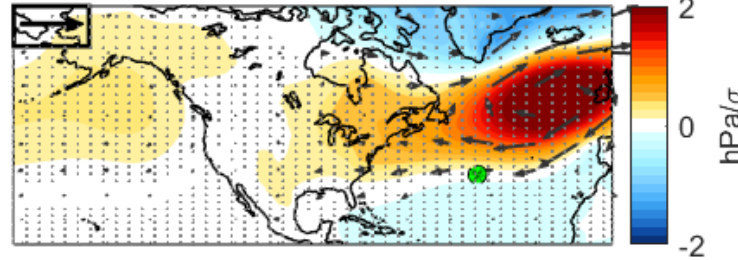
North Atlantic

As above, but for the North Atlantic high-pressure system.

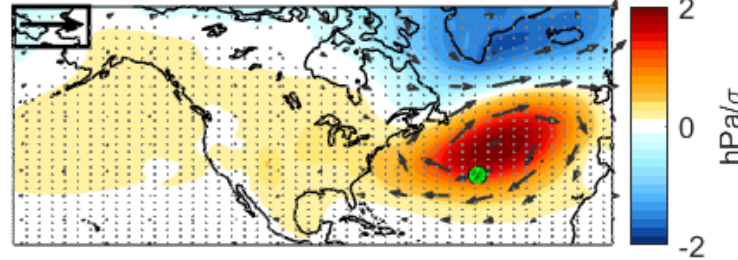
SLP regression to NASH lon (JJA)



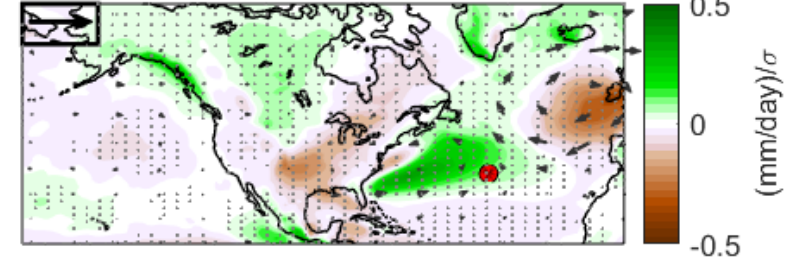
SLP regression to NASH lat (JJA)



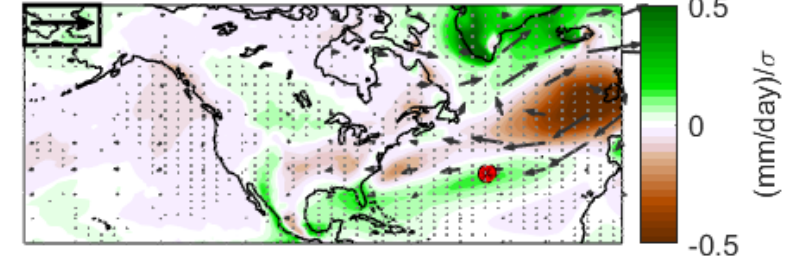
SLP regression to NASH str (JJA)



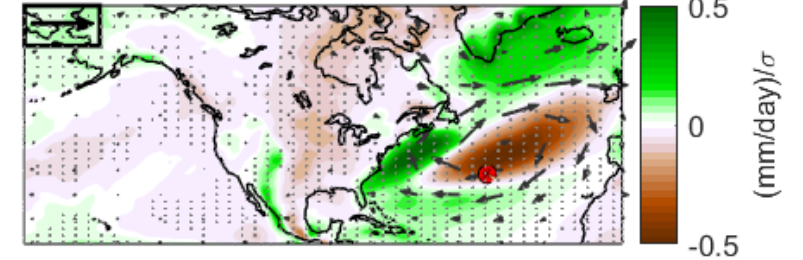
Precip regression to NASH lon (JJA)



Precip regression to NASH lat (JJA)



Precip regression to NASH str (JJA)

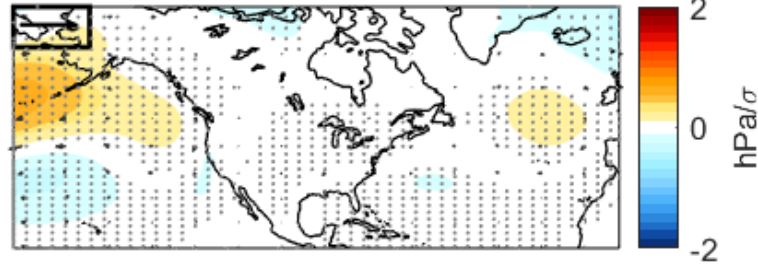


Hadley Cell

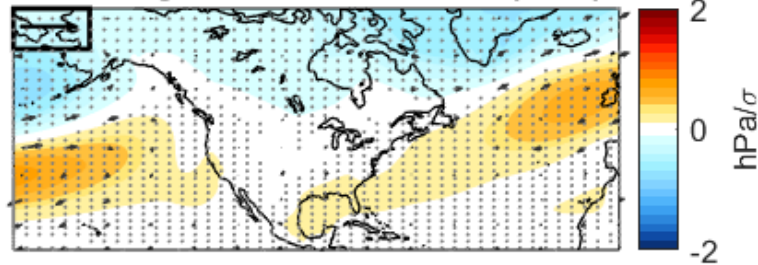
As above, but for the Northern Hemisphere Hadley cell.

Note that the response to the Hadley cell is considerably weaker.

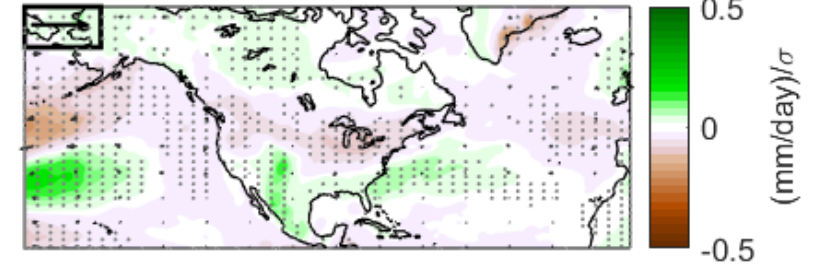
SLP regression to Psi lat (JJA)



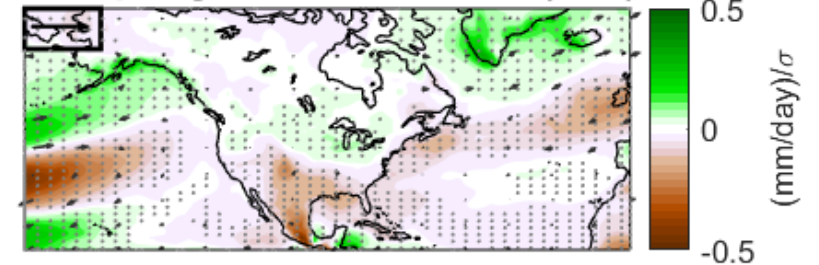
SLP regression to Psi str (JJA)



Precip regression to Psi lat (JJA)

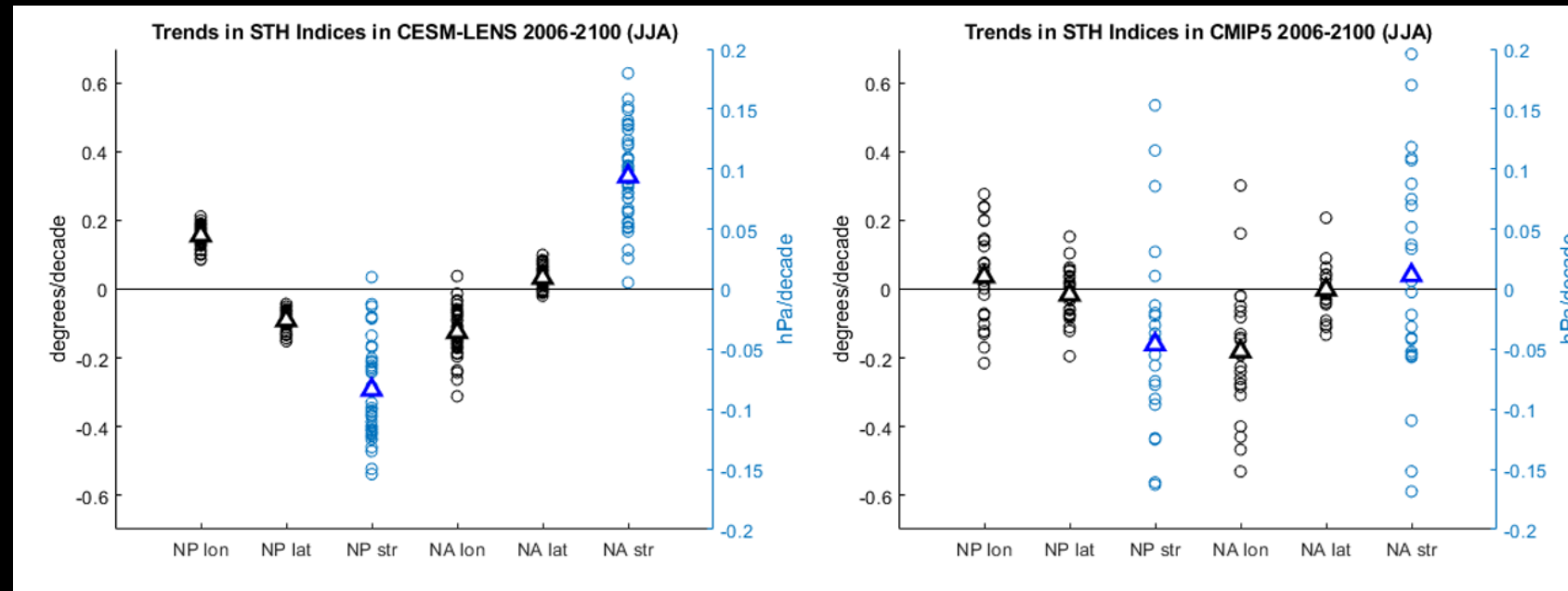


Precip regression to Psi str (JJA)



Trends

The previous slides showed the sensitivity of local climate to *short-term* variability in the subtropical highs.



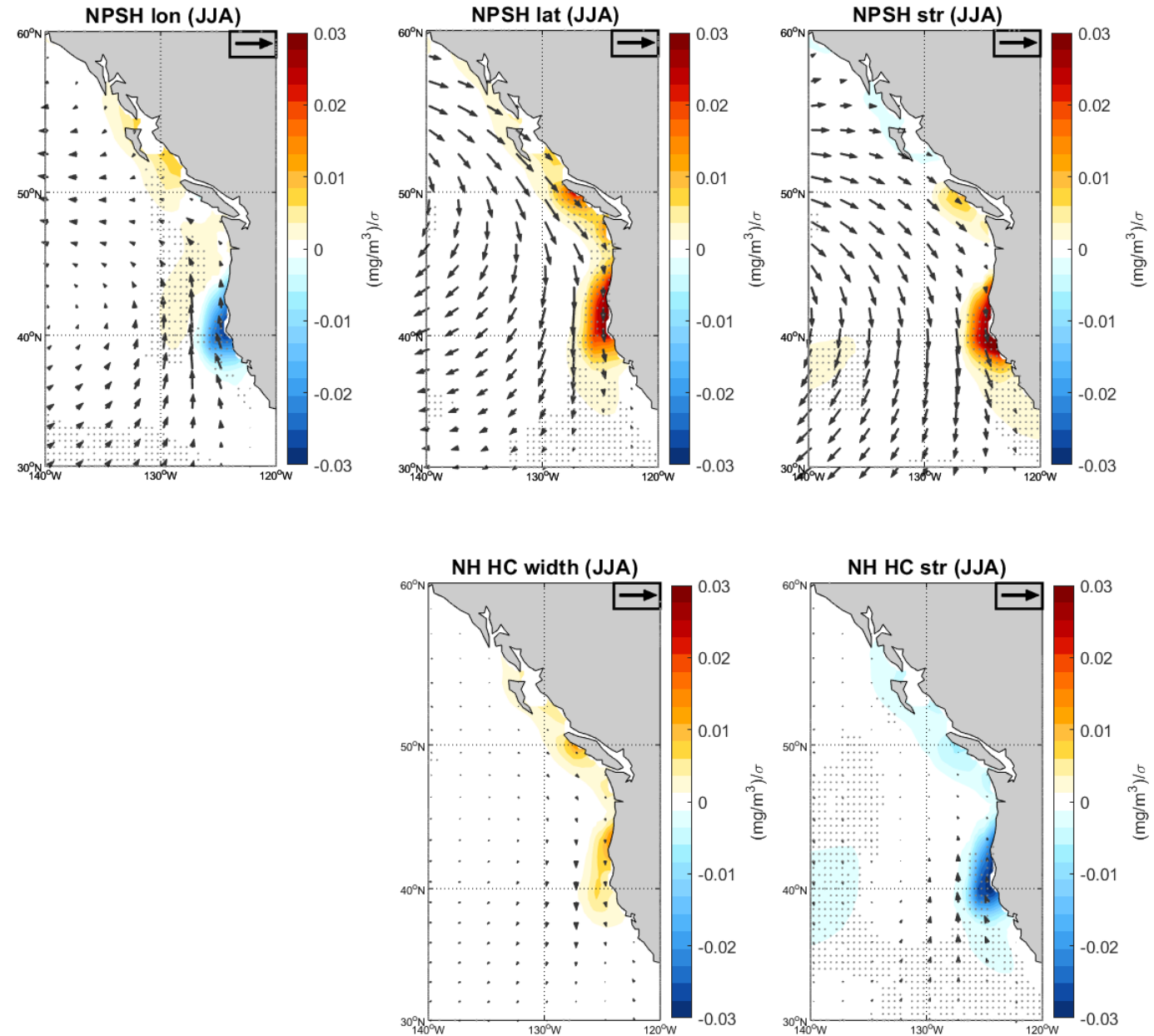
These trends stand out from internal variability in CESM (left), but are highly variable across CMIP5 models (right).

Subtropical high shifts can explain large fractions of the modeled full trend in precipitation.

Eastern Boundary Currents

Eastern boundary currents are primarily wind-driven, and are associated with upwelling regions and very productive ecosystems.

Preliminary results suggest that these systems also respond strongly to subtropical high shifts.



References

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