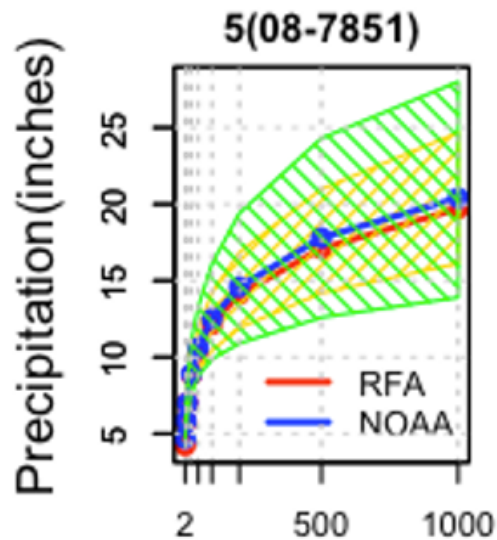


Precipitation Extremes and Impacts: Indices, IDF curves and LSMs

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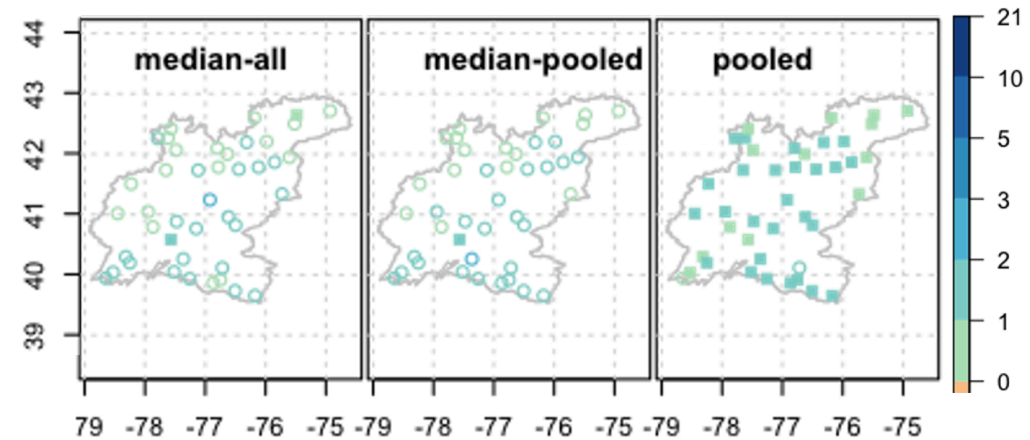
Work so far: Improved precipitation-frequency estimates



Method: Regional frequency analysis (Clustering)
Outcome: IDF Statistically indistinguishable from NOAA Atlas14 estimates, but less uncertain!

<https://doi.org/10.1016/j.jhydrol.2019.124095>

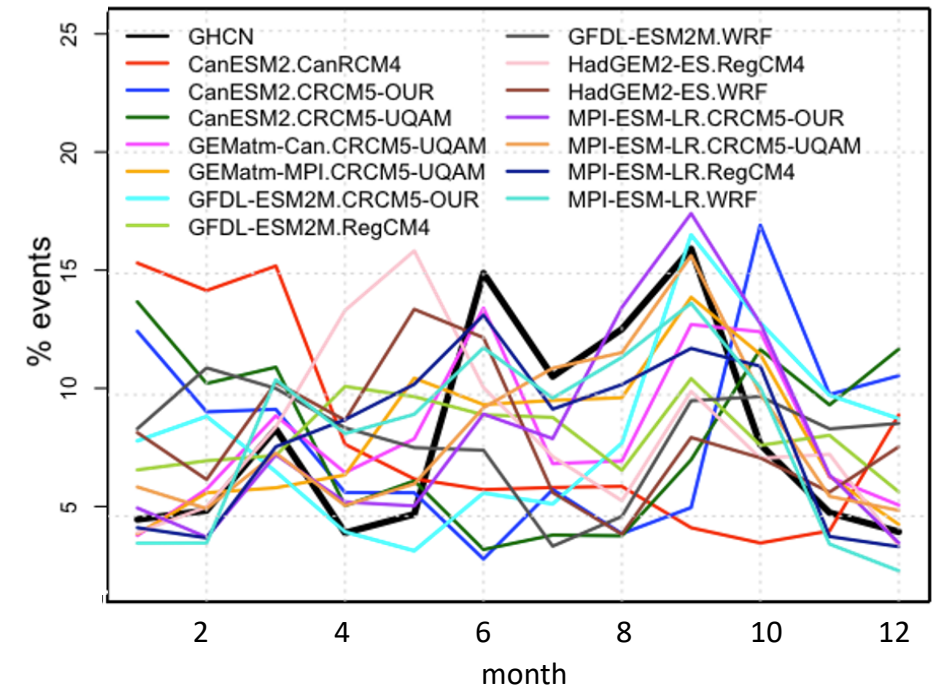
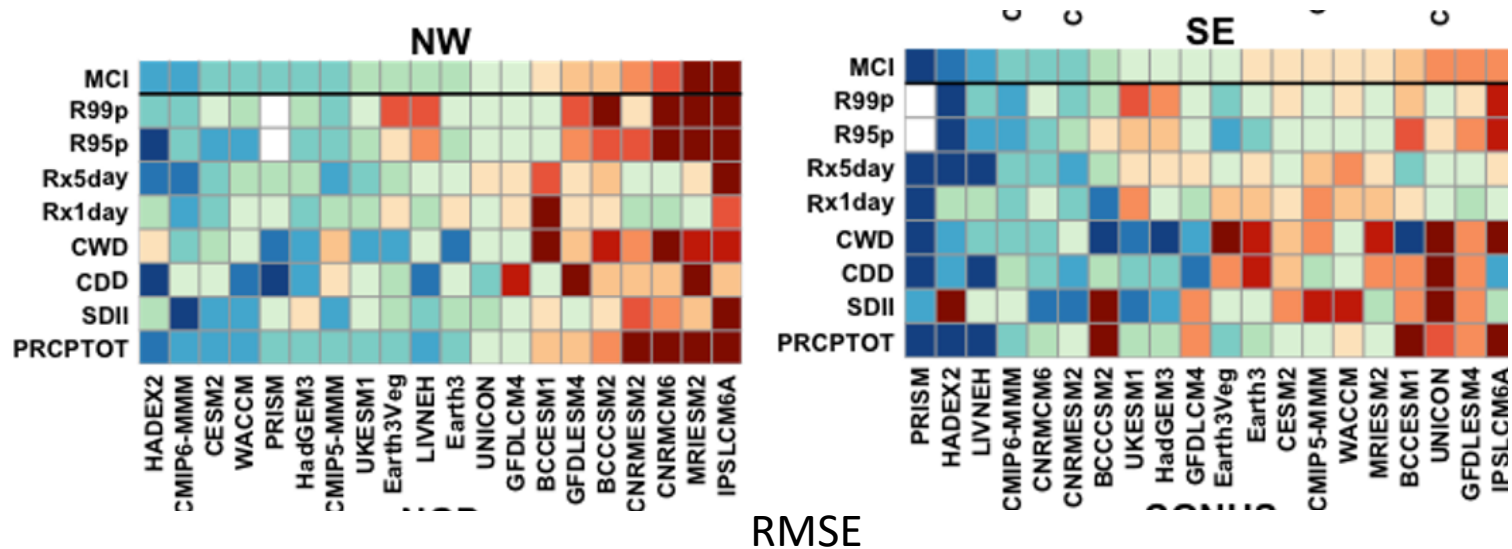
Changes in 50-year return level (inches)
NA-CORDEX | RCP8.5-minus-Historical



Methodology: Historical evaluation -> Bias-correction -> Pooling
Outcome: Reduction in bias and uncertainty -> Identifies significant changes at more stations than conventional (median) methods.
(Solid squares: significant changes)

Submitted to JHM

Work so far: Metric analysis of precipitation



CMIP6:

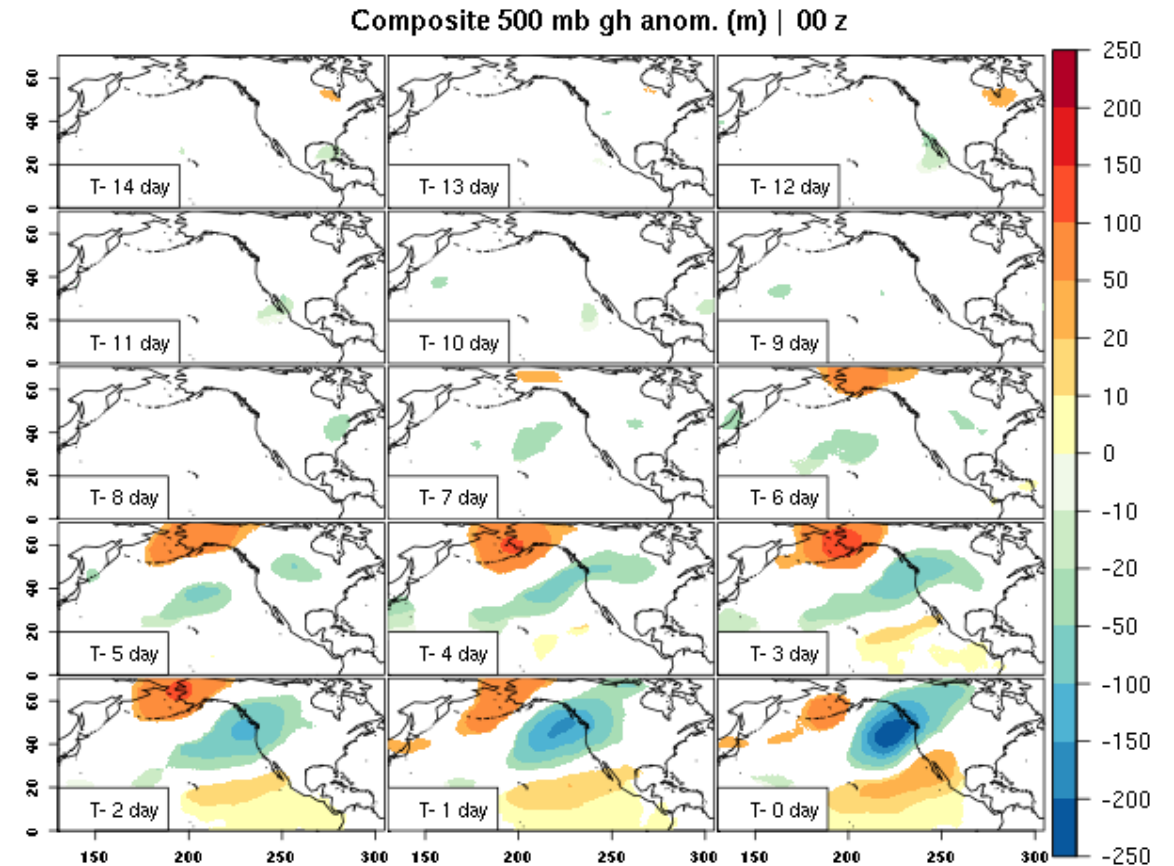
- Models' performance vary spatially
- CMIP6-MMM has similar but slightly smaller biases
- Large observational uncertainty.

NA-CORDEX models (0.22 degree):
Some models completely miss the seasonality.

<https://doi.org/10.1016/j.wace.2020.100268>

Work in progress: Large scale meteorological patterns (LSMPs) associated with extreme precipitation

- **LSMP analysis reveals connections between the local weather patterns that create the precipitation extremes and remote influences.**
- An LSMP is not merely a composite of some sort. They also must include indication of what is relevant via some statistical test (bootstrap, sign count, t-test, etc...)
- Identify clusters in LSMPs of meteorological variables associated with Precipitation extremes.
- Evaluate fidelity of high resolution climate models in simulating the LSMPs, namely are the models capturing the local and the remote factors leading to the PEx events.?



Composites of 500mb geopotential height anomalies (m).
Areas shown are significant at the 5% significance level
using bootstrap procedure. Target region: Northern California

White paper content

- The regional frequency analysis reduces uncertainty of estimates.
- The multimodel IDF analysis reduces both the bias and uncertainty of estimates. It is able to identify significant changes at more stations than conventional (median) methods.
- The metric evaluation of GCMs and RCMs identifies reasonably performing models at regional scales. Use of reasonably performing models leads to more credible projections.
- The LSMP work 1) improves basic understanding, 2) identifies links across large (even global) spatial scales (and different time scales), and 3) provides a high-level way of assessing models thereby improving prediction.