

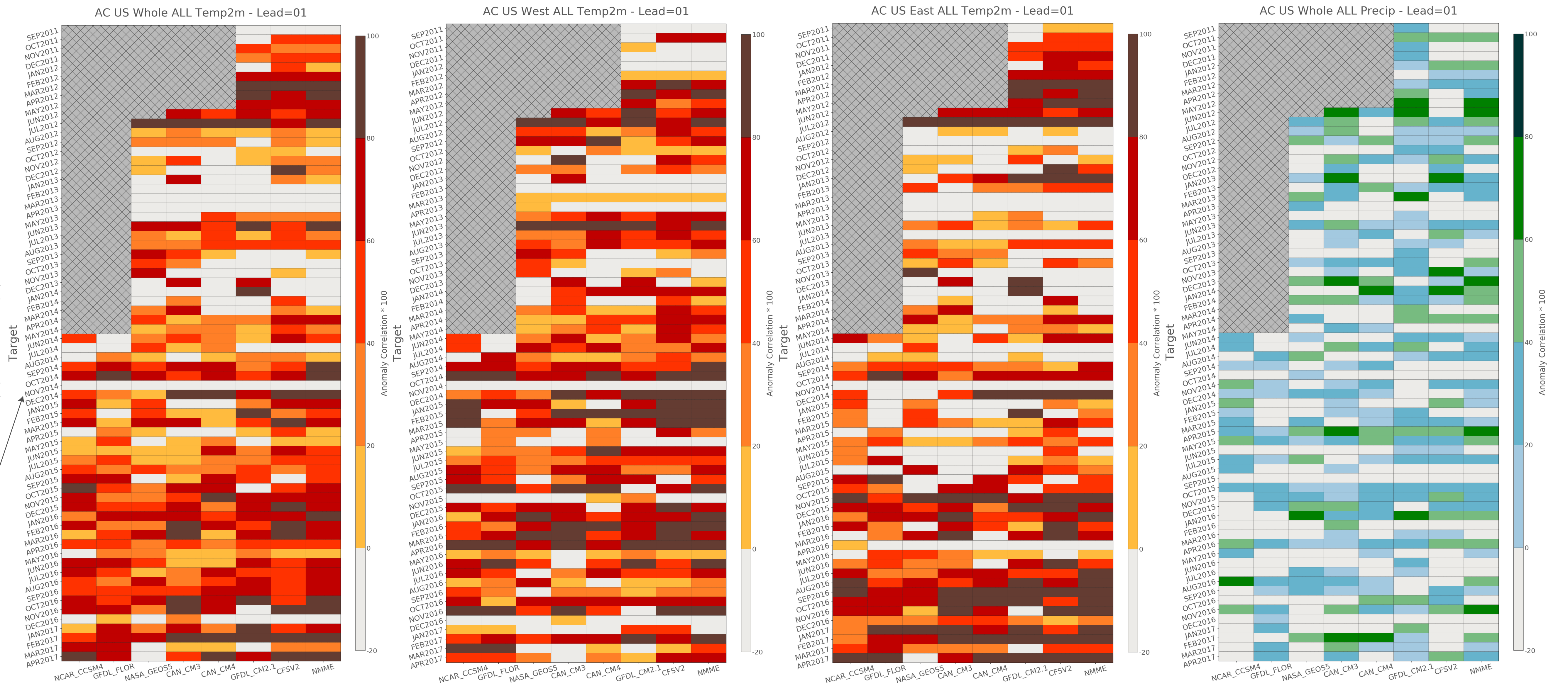
Seasonal and Regional NMME Investigation and Visual Updates

Andrew Huang and Dr. Emily Becker

Because the historical forecast archive of the NMME now contains data from more than five years ago, there is potential for new insight, and on the way, various upgrades as well.

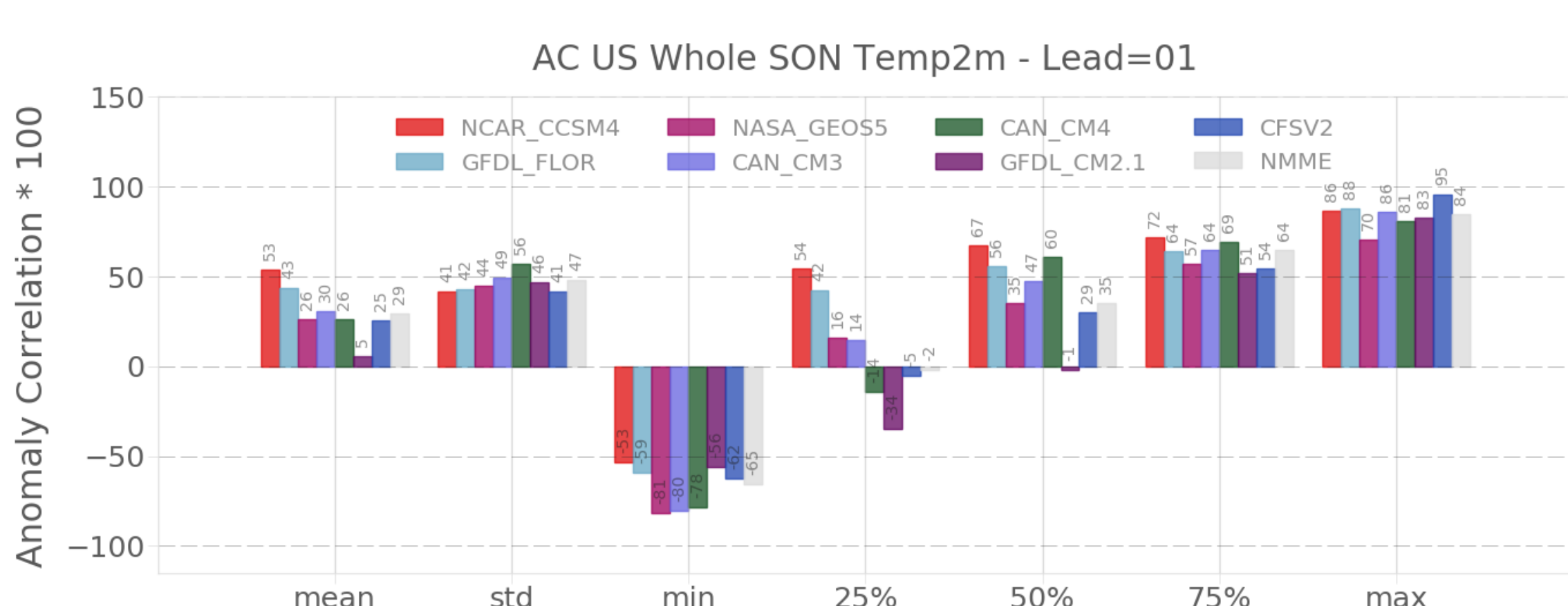
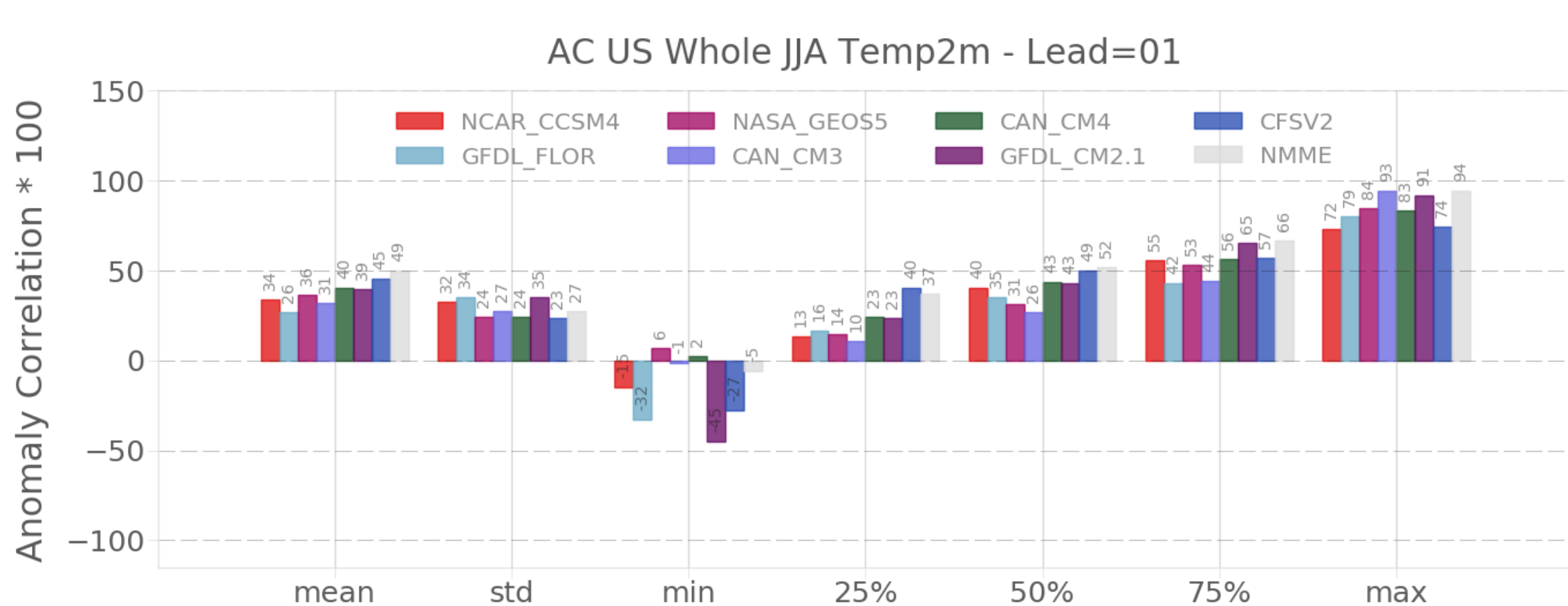
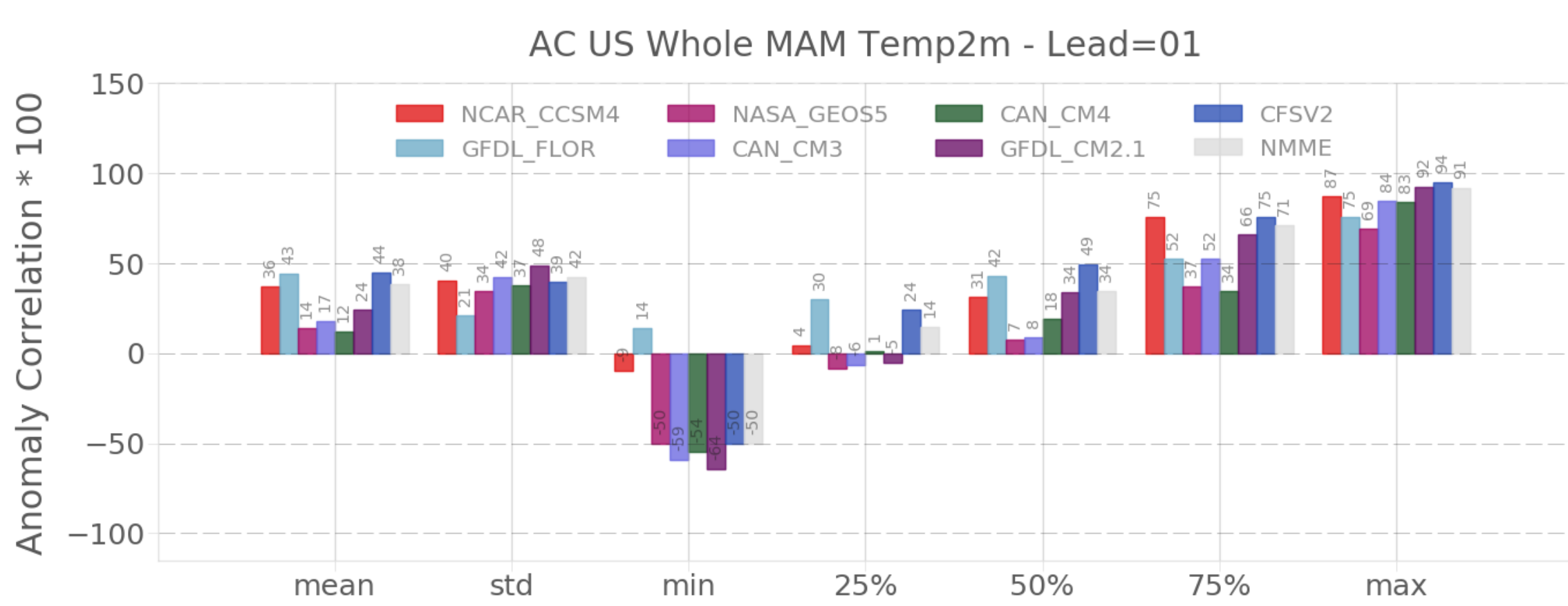
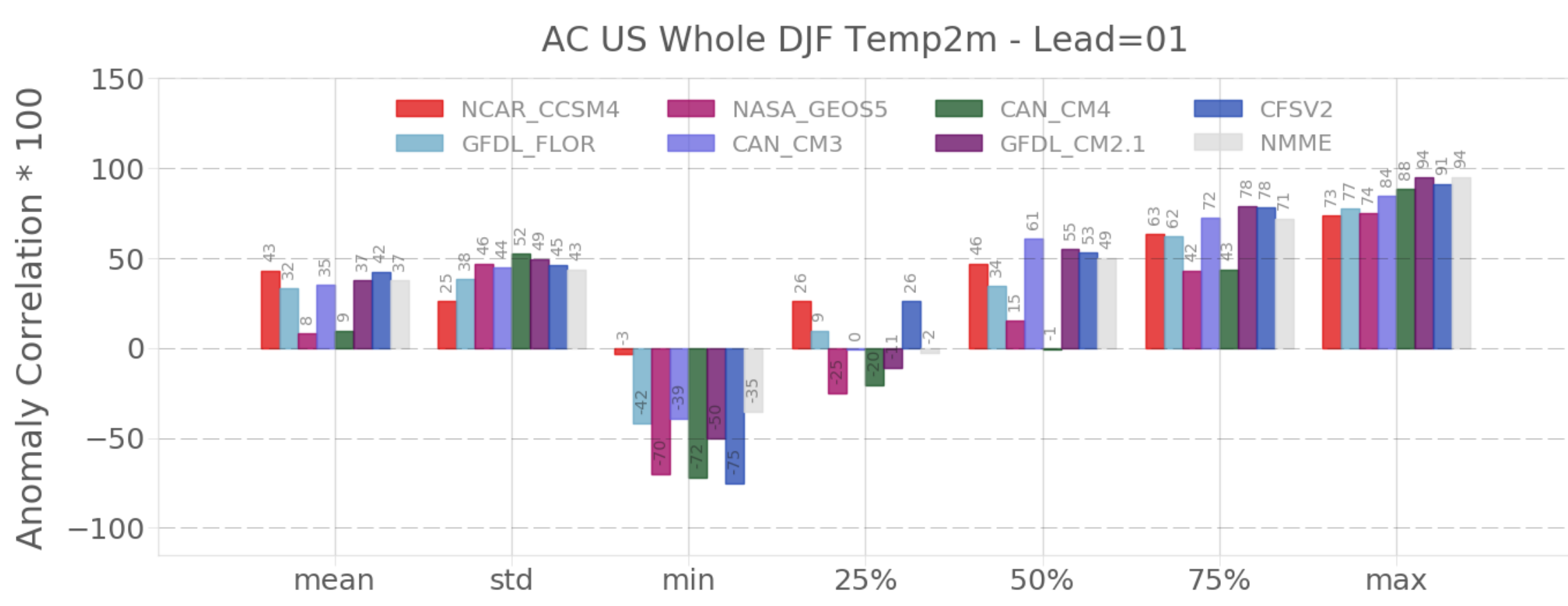
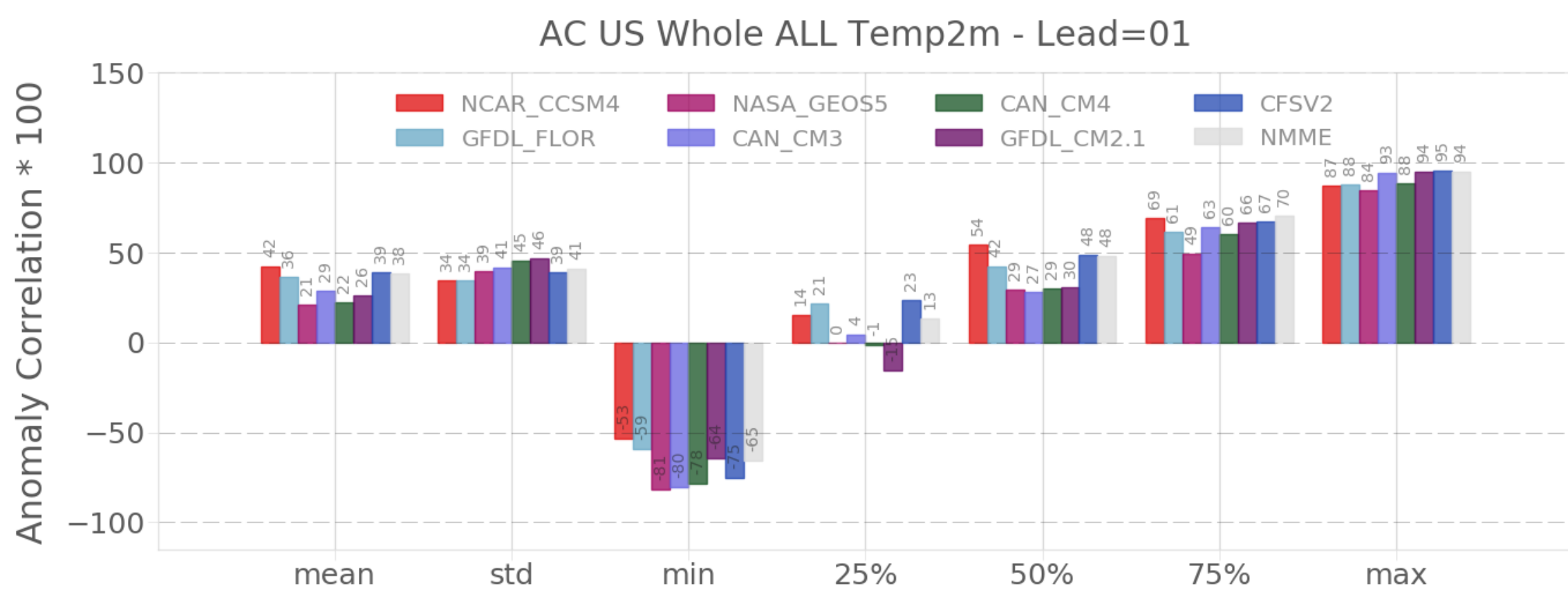
Anomaly Correlations (ACs) Heatmaps

- ACs indicate how well forecast anomalies correlate with observed anomalies
- Here, ACs bar plots are consolidated into heatmaps, useful as overviews
- Darker colors symbolize higher ACs which in turn indicates greater model skill
- Lighter colors symbolize lower ACs which in turn indicates lesser model skill
- Viewers can now quickly discern months of extreme ACs or trends across months/models without having to peruse through each individual AC bar plot one by one
- For instance, viewers can quickly determine that during November 2014, temperature ACs were in the negatives, meaning as observed anomalies increased, forecast anomalies decreased, which is undesirable
- Viewers can also eyeball the shades of color and notice there are relatively more darker shades of ACs displayed in the western US heatmap than in the eastern US heatmap indicating that forecasts of temperature in the west are somewhat better
- In addition, again eyeballing the shades of color, viewers may recognize that forecasts for temperature generally outperform forecasts for precipitation because there are more counts of darker shaded boxes in the temperature heatmap than in the precipitation heatmap

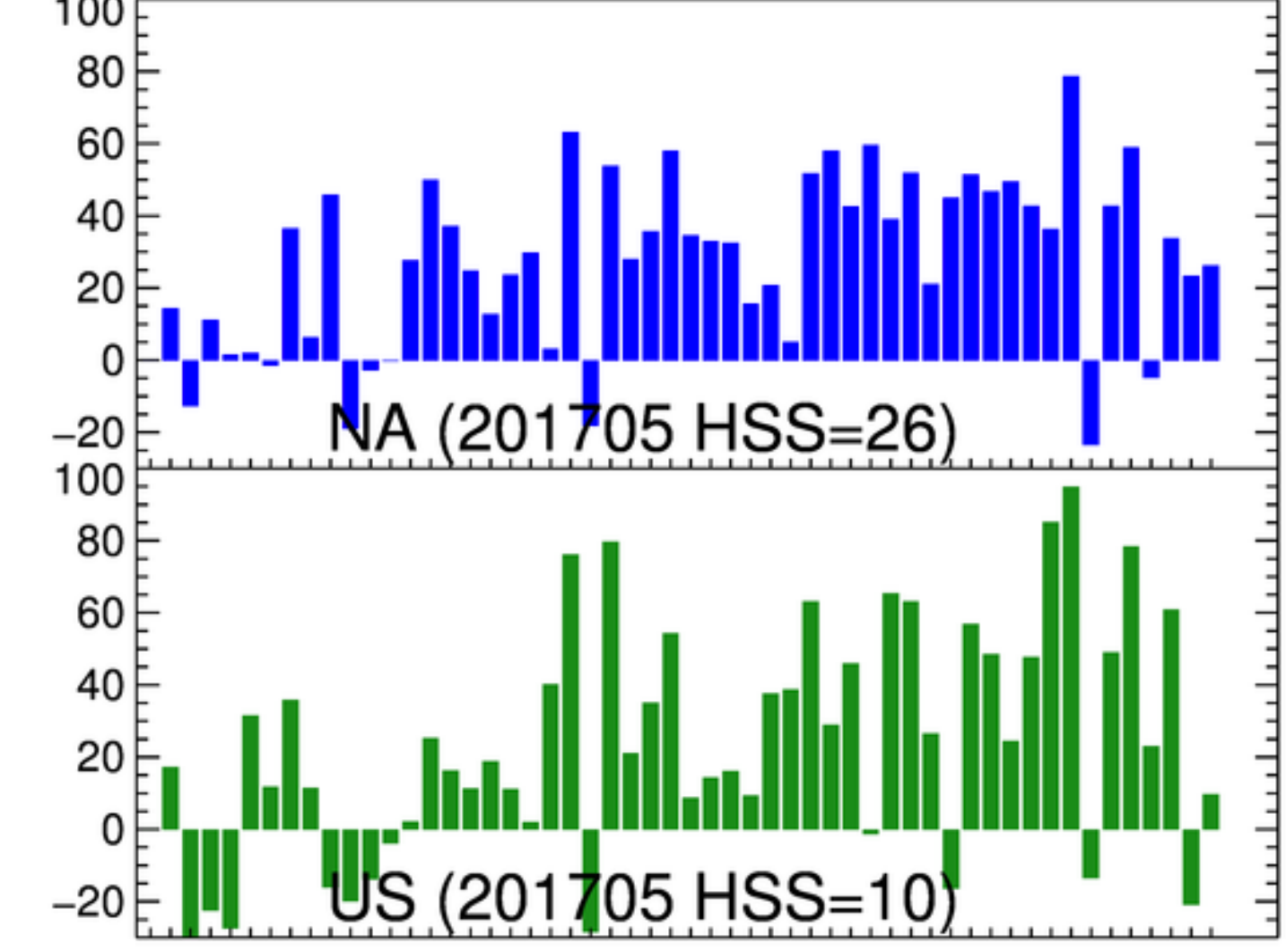


ACs Averaged Over Time Bar Plots

- Here, the ACs are averaged over time to gain a quick summary of skill for each model
- These plots convey that, overall, NMME holds consistent, high skill from the fact that the NMME's mean and median (50%-tile) is often within the top three highest ranking models
- These plots also show that the NMME has the lowest average and median AC (29 and 35) during the fall (SON) and highest average and median AC (49 and 52) during the summer (JJA).
- During JJA though, the standard deviation (std) is relatively small compared to other seasons

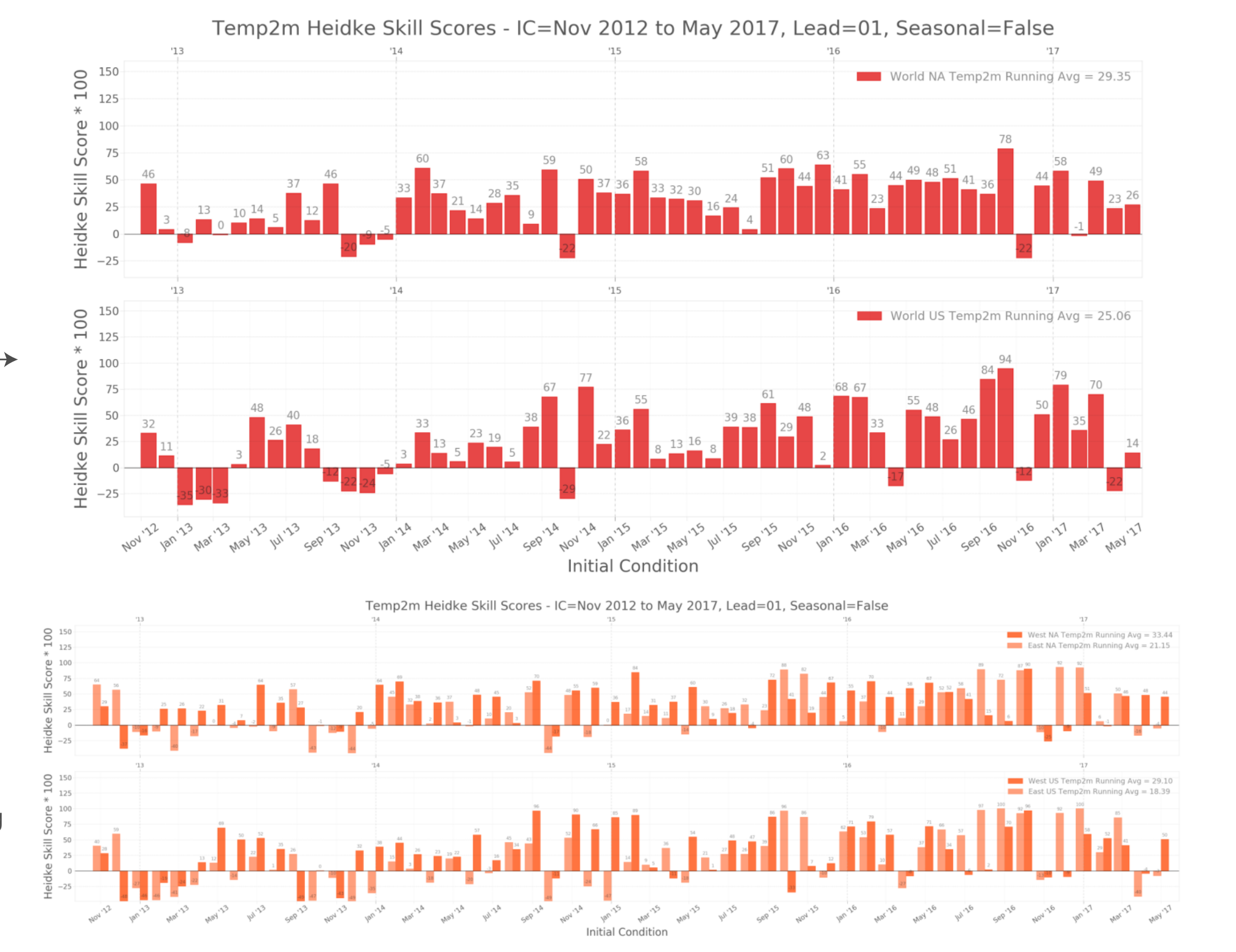


All tmp2m lead-1 prob. fcsts Nov2012 - present

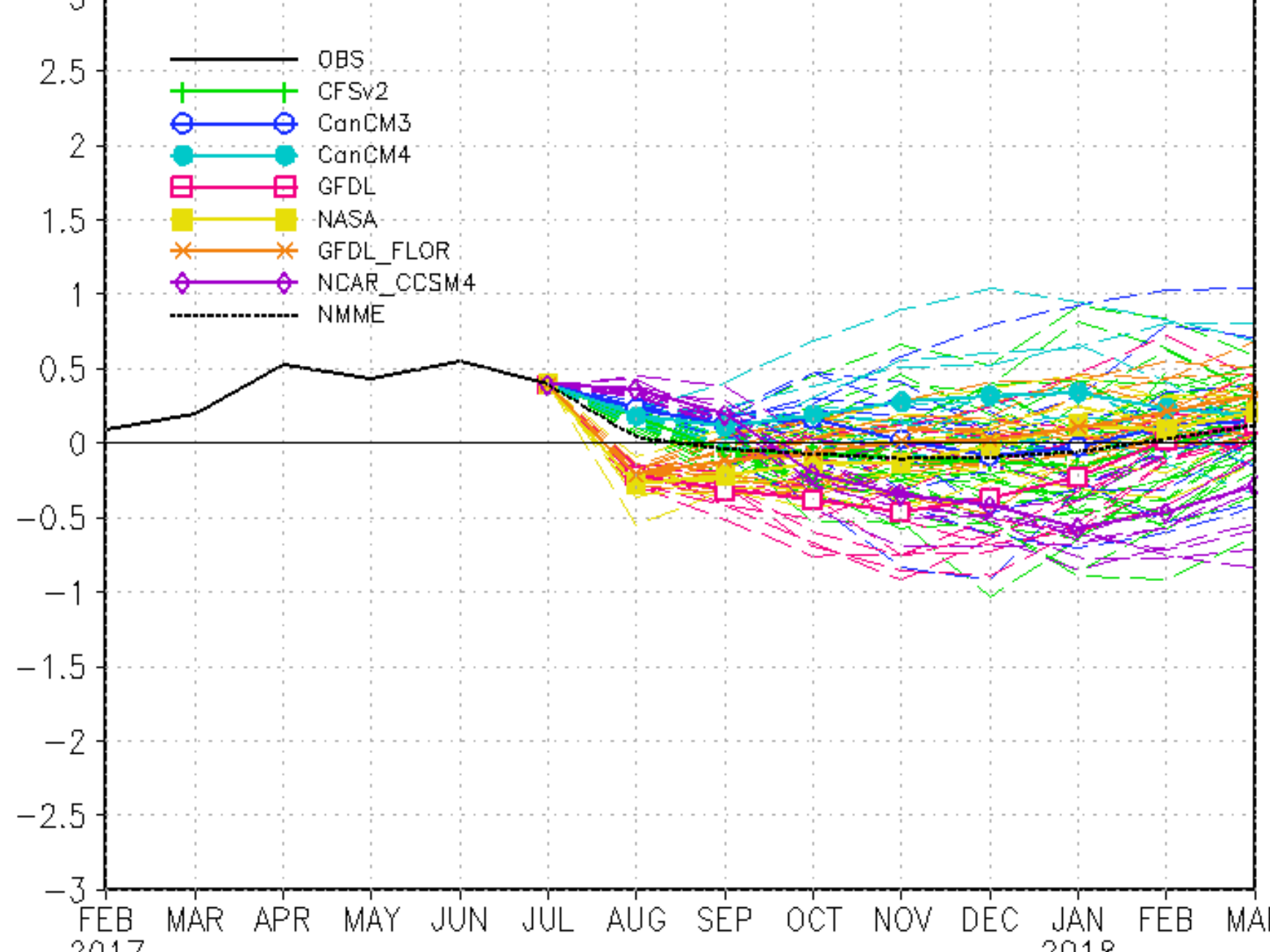


Heidke Skill Scores (HSSs) Bar Plots

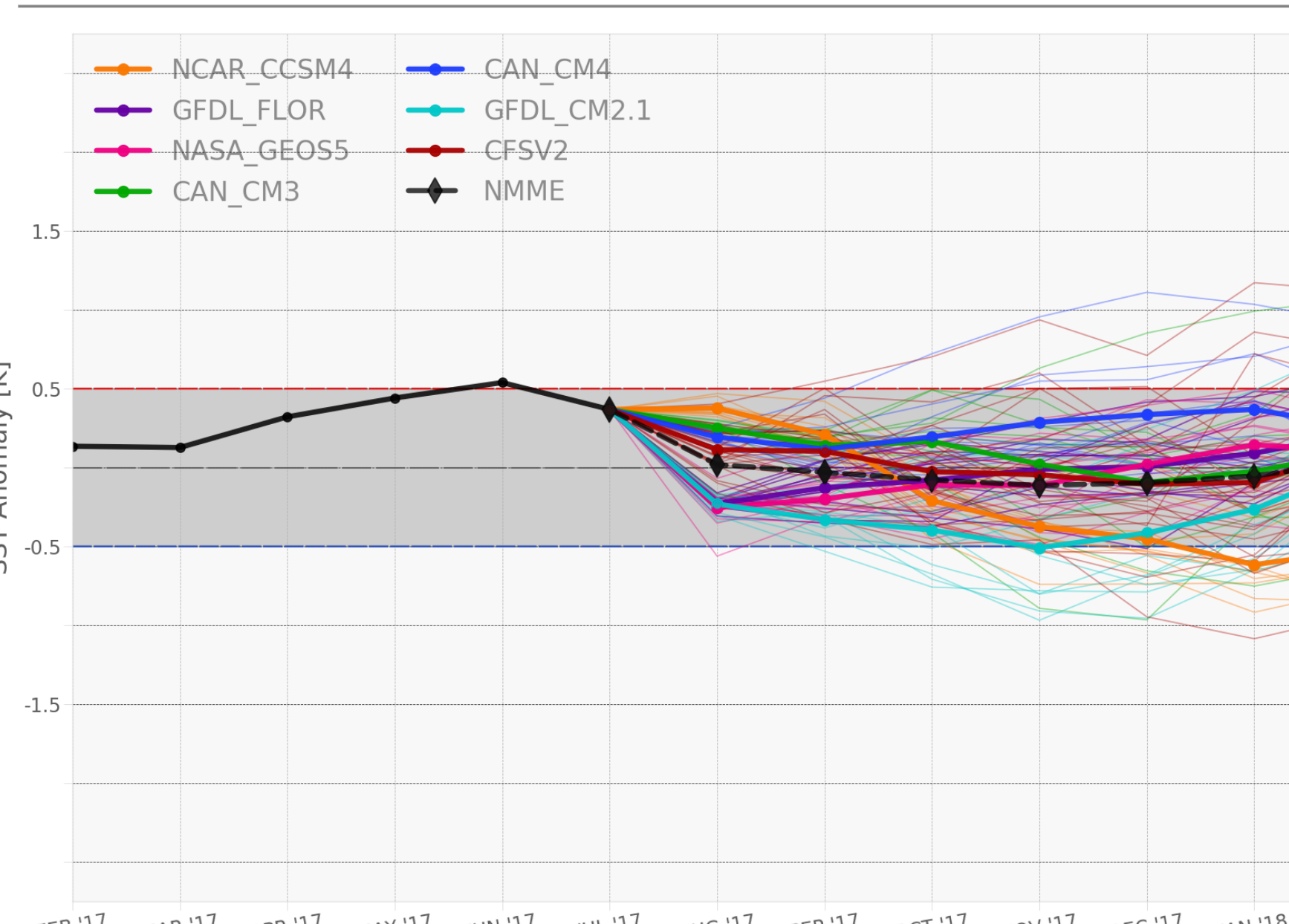
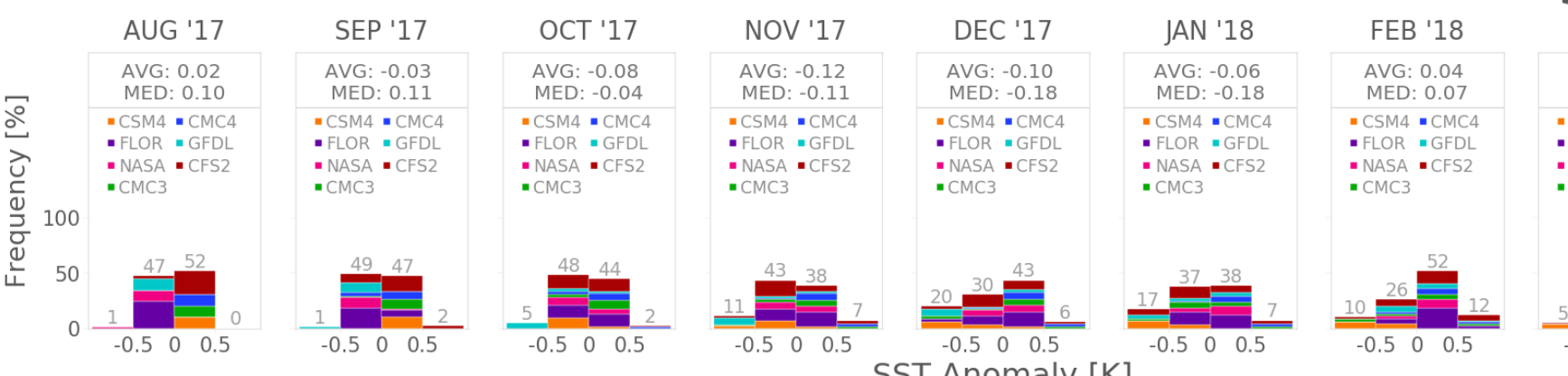
- HSSs measure how well categorical forecasts perform relative to random guessing
- Here, the HSSs bar plot was upgraded to include x labels and direct label
- The HSSs are also computed for west and east partitions of the US, and like ACs, the west, again, has higher skill compared to the east



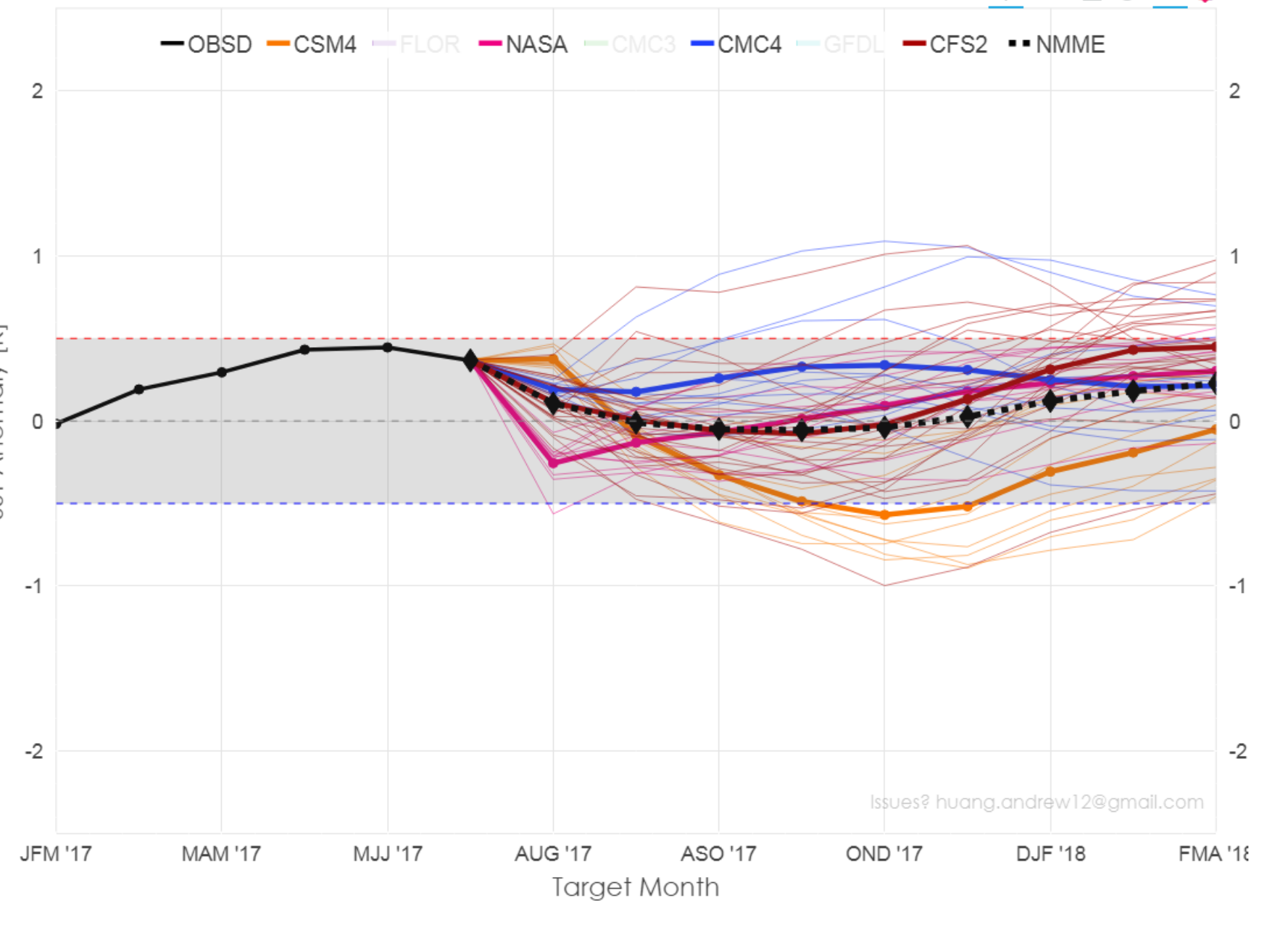
NMME Forecast for Nino 3.4 (scaling) IC= 201708



NMME Nino 3.4 Forecast Scaled=True, IC=Aug2017



NMME Nino 3.4 Forecast: Seas True Cal True, IC=Aug2017



Nino 3.4 Static and Interactive Plumes

- The plumes show the progression of El Nino over time, and the Climate Prediction Center (CPC) declares the onset of an El Nino when the 3-month average sea-surface temperature exceeds 0.5 K in the east-central equatorial Pacific (5S - 5N and 120W - 170W)
- Here, the static plume (left) is upgraded to offer more insight such as stats stating the average and median of all the models across time, histograms that display the category the individual members fall in, thick, opaque lines for ensemble averages, thin translucent lines for members, gray shading to indicate neutral conditions, and right side labels for easier value correspondence.
- An interactive version is also available (top) which allows users to turn on/off specific models that they believe have issues which then recalculates the NMME line, show/hide ensemble members to reduce clutter, and save sets of model selections and compare them quickly.

Acknowledgements

- NCEP Climate Prediction Center, Dr. David Dewitt, Dr. Genevieve Fisher, and Ashley Burrell for the wonderful internship experience
- The Department of Atmospheric Sciences at the University of Illinois at Urbana-Champaign for their continual support and awesome education
- CPAESS/UCAR for their generous financial support

Contact Email

ahuang11@illinois.edu