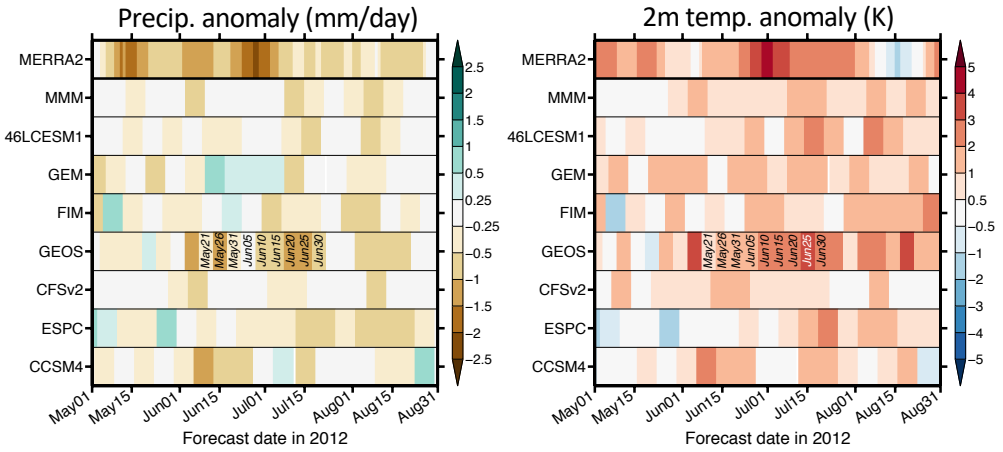
Subseasonal prediction of U.S. summer flash droughts

We examined the prediction skill of rapid onset droughts (a.k.a. flash droughts) in current-generation global forecast models participating in the Subseasonal Experiment (SubX) project. Focusing on the extreme U.S. Great Plains summer flash drought of 2012, we found that the prediction skill for subseasonal lead times (3-4 weeks in the future) is highly variable among models.



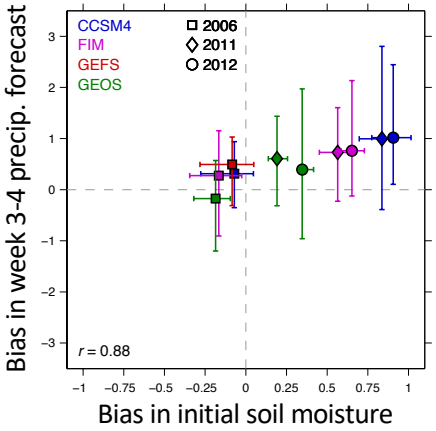
The top row shows the observed temporal evolution of precipitation and temperature anomalies from MERRA-2 during the summer of 2012. Subsequent rows are corresponding week 3-4 forecasts from SubX models.

More skillful forecasts result from:

1) More accurate land initialization.
2) Accurate prediction of a quasi-stationary Rossby wave train in 2012.

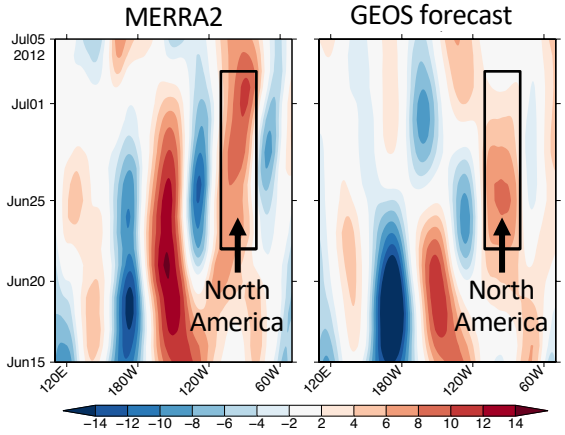
The results imply that some models need to improve their land initialization and that we need a better understanding of the sources of Rossby wave trains.

1) land initialization



Forecast skill vs. land initialization accuracy for three central U.S. summer flash droughts and four SubX models.

2) 2012 Rossby wave train



Left: longitude vs. time plot of 200mb geopotential height anomaly in MERRA-2. Right: GEOS forecast initialized June 10.

*DeAngelis, A. M., H. Wang, R. D. Koster, S. D. Schubert, Y. Chang, and J. Marshak, 2020: Prediction skill of the 2012 U.S. Great Plains flash drought in Subseasonal Experiment (SubX) models. J. Climate, **33**, 6229-6253.*