Supplementary Material for

Prediction of Extreme Events in Precipitation and Temperature over CONUS during Boreal Summer in the UFS Coupled Model

V. Krishnamurthy[1] and Cristiana Stan[2]

[1]*Center for Ocean-Land-Atmosphere Studies*
George Mason University
Fairfax, Virginia

[2]*Department of Atmospheric, Oceanic and Earth Sciences*
George Mason University
Fairfax, Virginia

Corresponding author: V. Krishnamurthy, vkrishna@gmu.edu

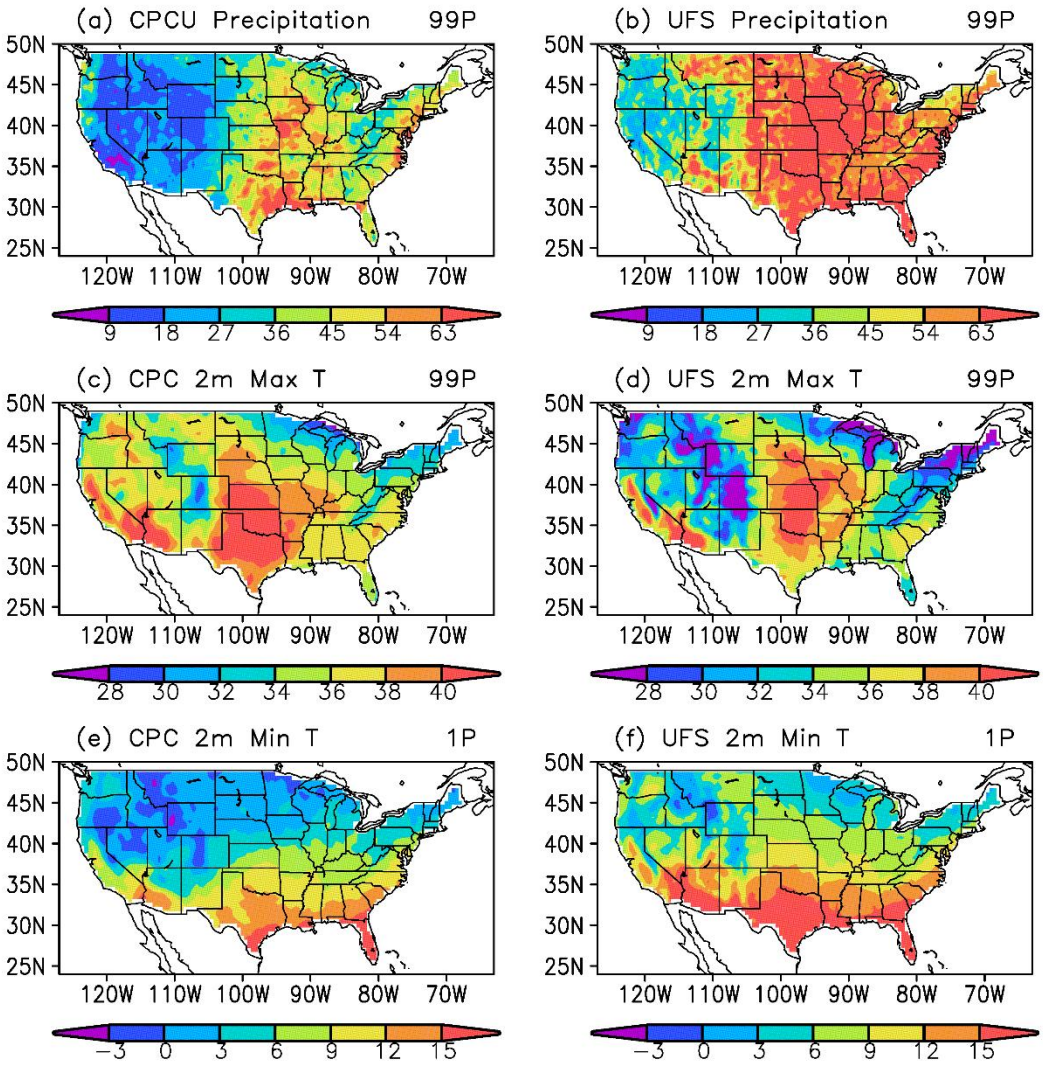

Fig. S1 99th percentile of precipitation (mm day^{-1}) in (a) CPCU observation and (b) UFS forecasts, 99th percentile of daily maximum 2m temperature (°C) in (c) CPC observation and (d) UFS forecasts and 1st percentile of daily minimum 2m temperature (°C) in (e) CPC observation and (f) UFS forecasts for the period JJAS 2011–2017.

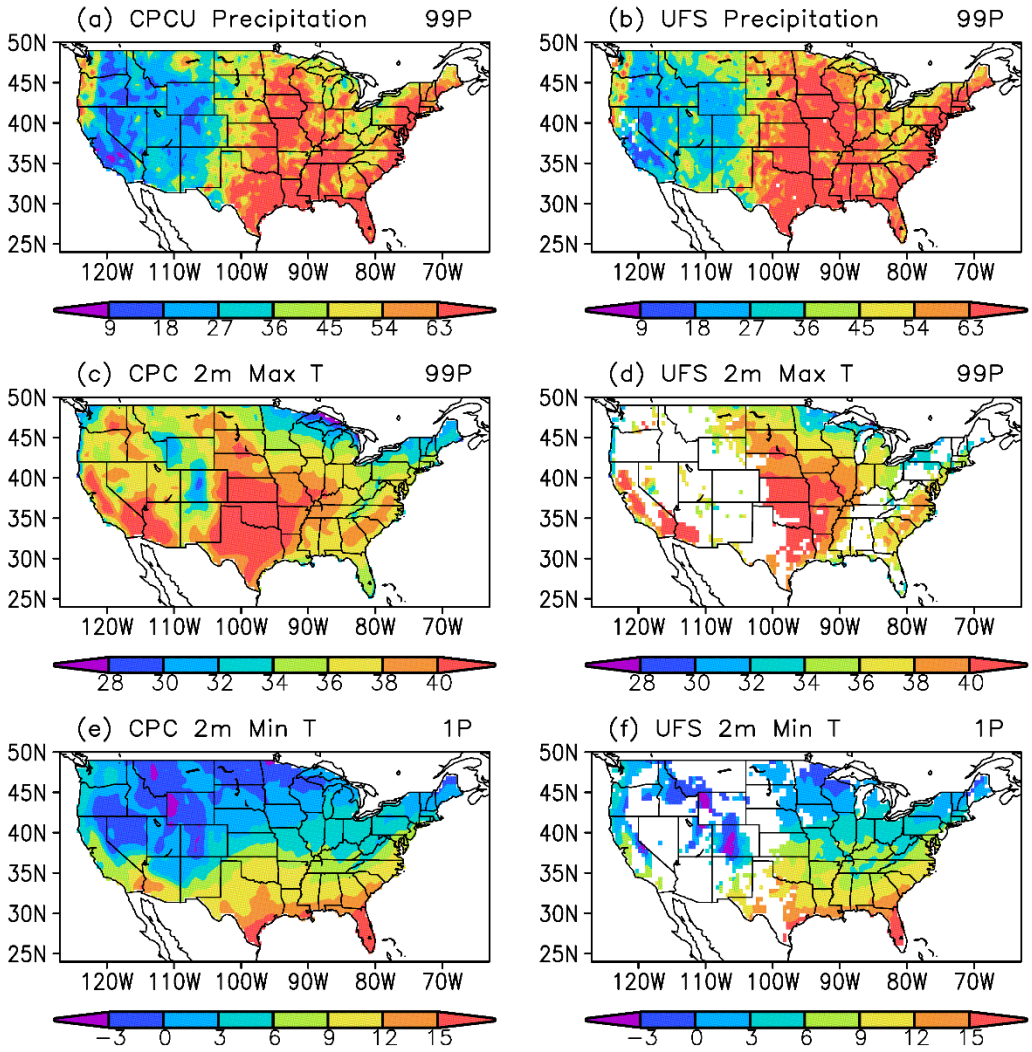

Fig. S2 Composites of precipitation (mm day^{-1}) in (a) CPCU observation and (b) UFS forecasts exceeding the 99P of observation, composites of daily maximum 2m temperature (°C) in (c) CPC observation and (d) UFS forecasts above the 99P of observation and composites of daily minimum 2m temperature (°C) in (e) CPC observation and (f) UFS forecasts below the 1P of observation for the period JJAS 2011–2017. The forecasts initiated from 1st and 15th of each month during JJAS 2011–2017 are used in the composites. The composites are averages over the entire period. The unshaded white regions over CONUS indicate that the extreme events did not occur at those grid points.

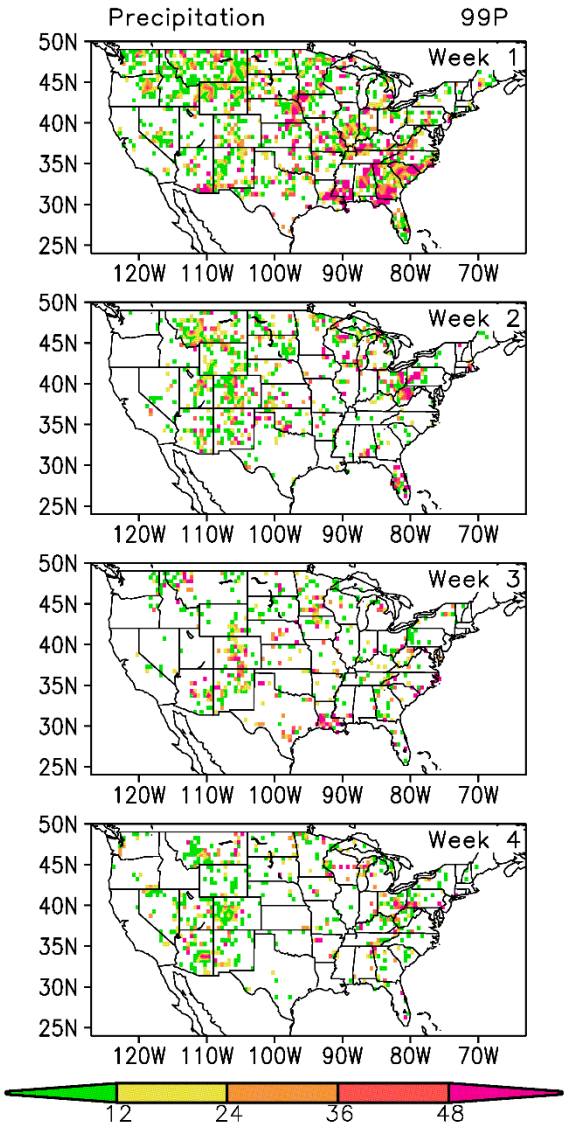

Fig. S3 RMS errors of UFS forecasts in precipitation (mm day^{-1}) above 99P of observation for the first weeks of the forecasts. The RMS errors were computed using all the forecasts initiated from 1st and 15th of each month during JJAS 2011–2017. The unshaded white regions over CONUS indicate that the extreme events did not occur at those grid points.

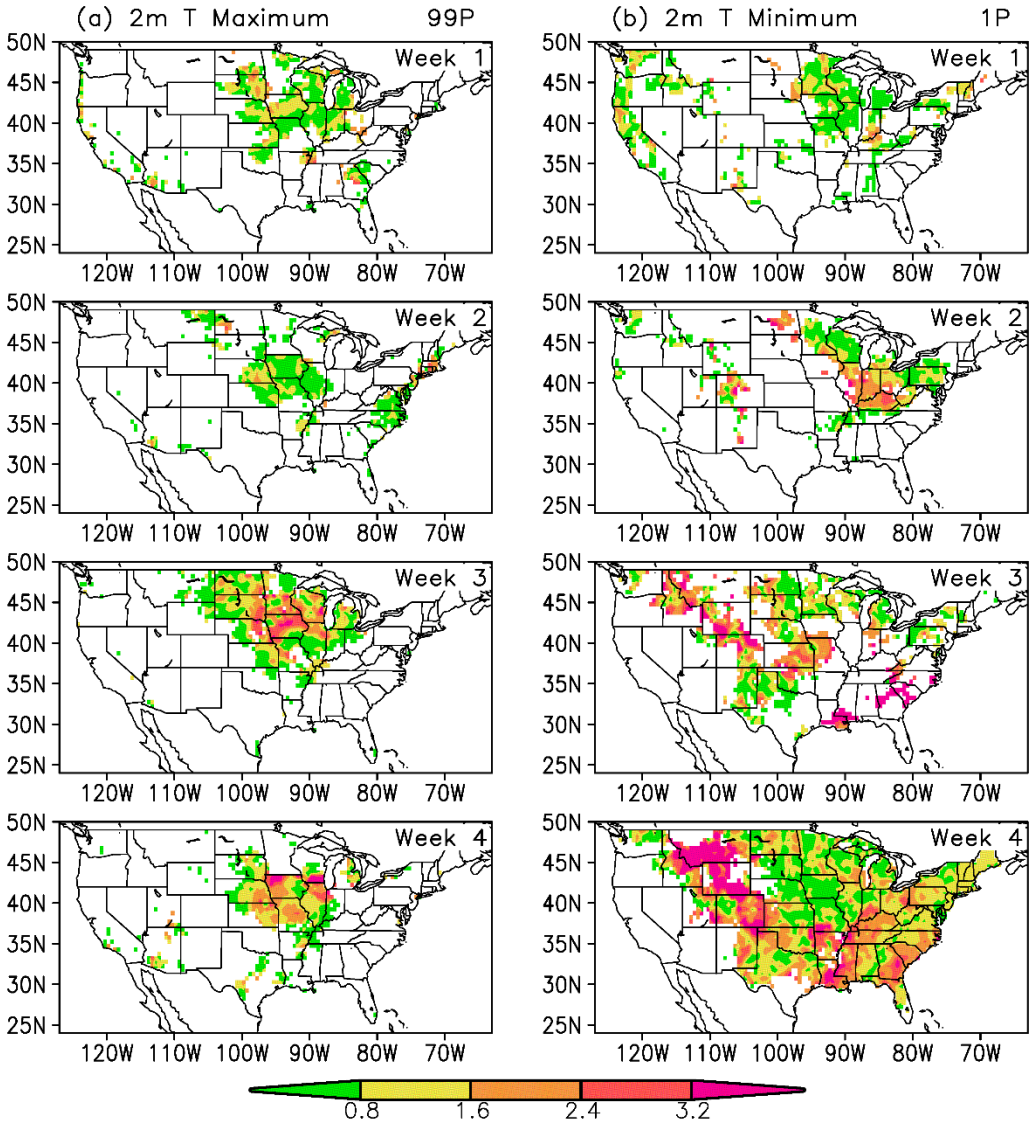

Fig. S4 RMS errors of UFS forecasts in maximum 2m temperature (°C) above 99P of observation (left panels) and RMS errors in minimum 2m temperature (°C) below 1P of observation (right panels) for the first weeks of the forecasts. The RMS errors were computed using all the forecasts initiated from 1st and 15th of each month during JJAS 2011–2017. The unshaded white regions over CONUS indicate that the extreme events did not occur at those grid points.

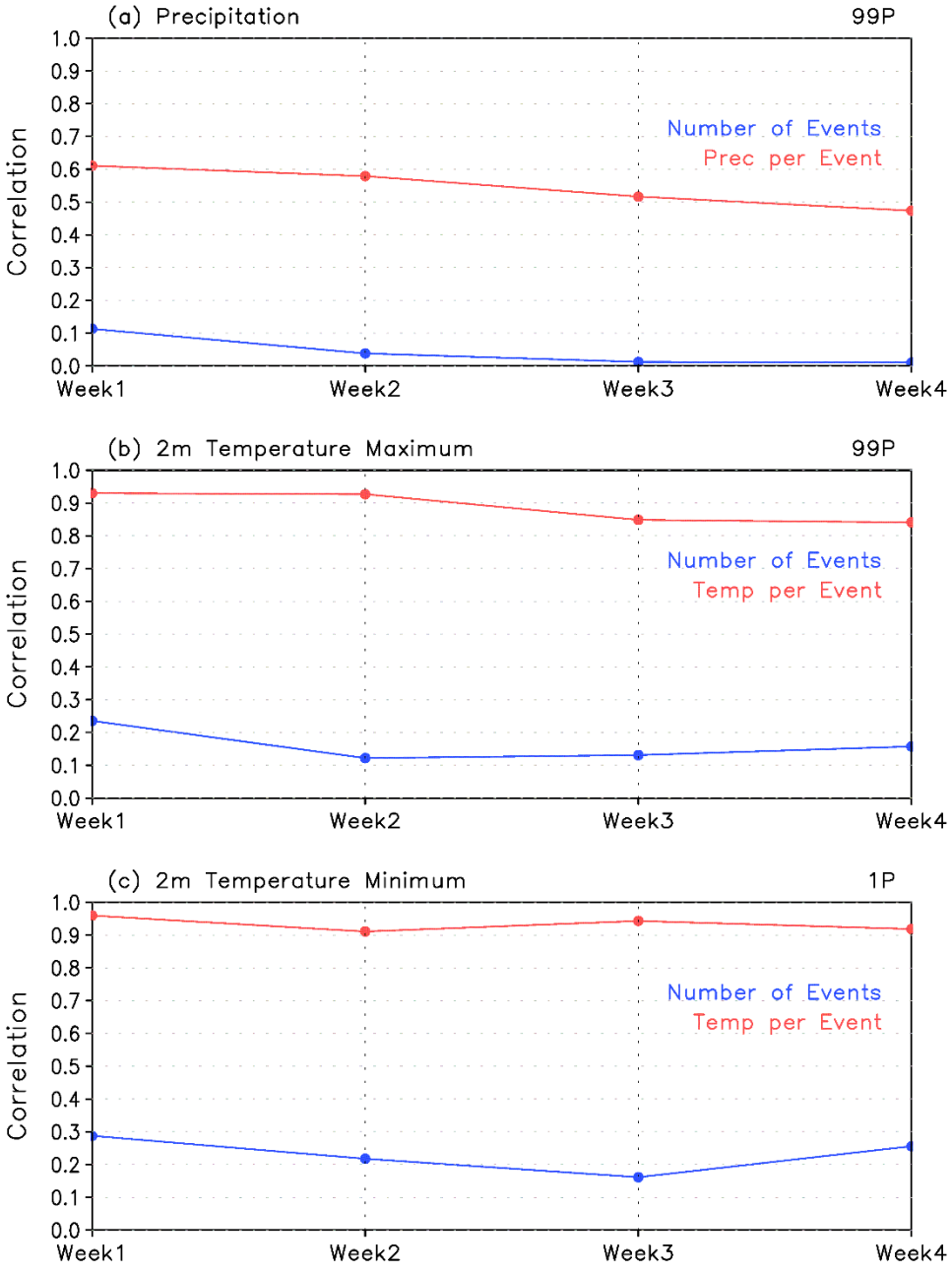

Fig. S5 Spatial correlation between forecasts and observations of (a) number of events (blue) and precipitation per event (red) in precipitation above 99P (b) number of events (blue) and maximum 2m temperature per event (red) above 99P and (c) number of events (blue) and minimum 2m temperature per event (red) below 1P. The correlations were computed using all the forecasts initiated from 1st and 15th of each month during JJAS 2011–2017.

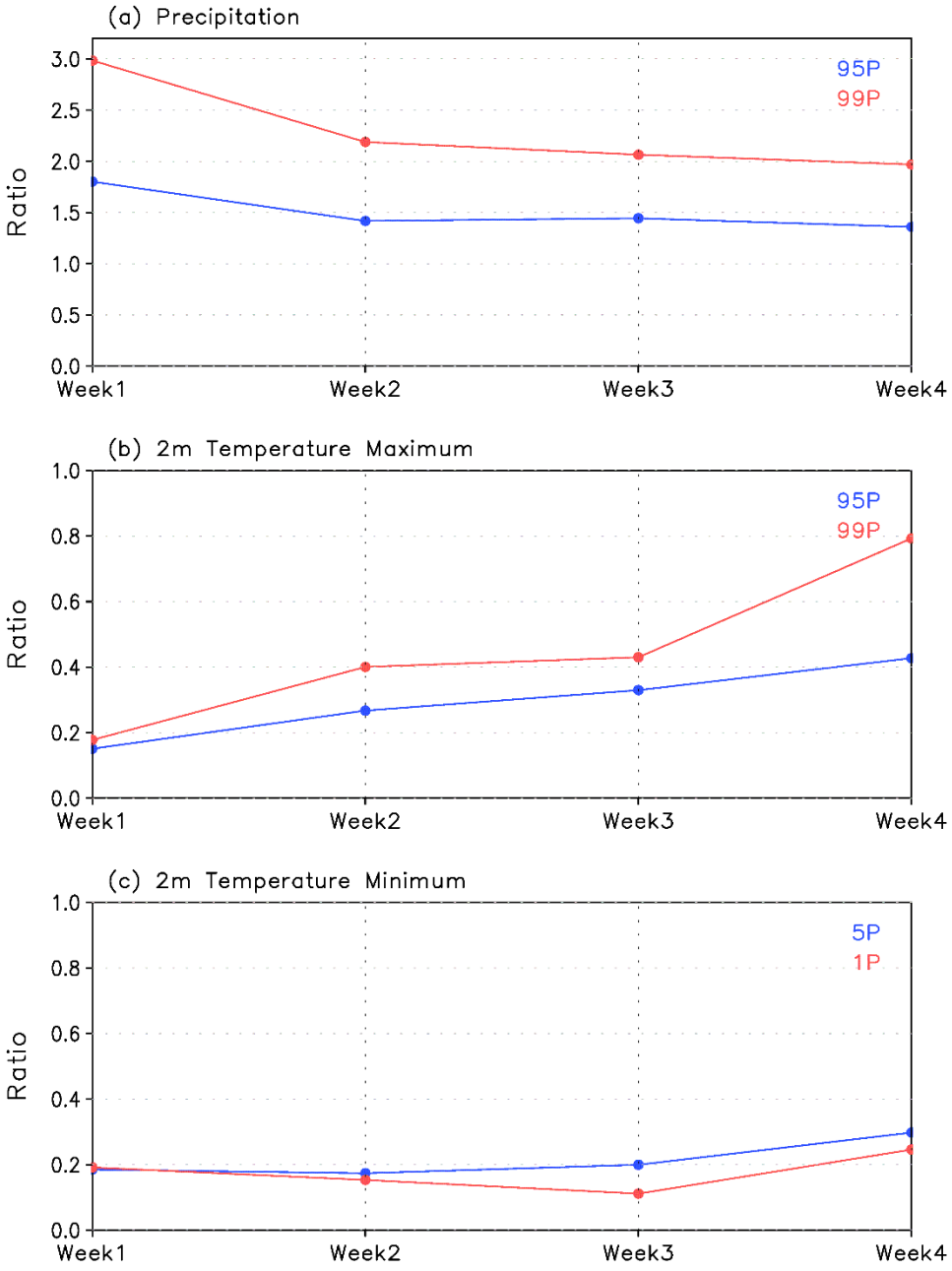

Fig. S6 Ratio of the number of grid points where the extreme events occur in forecasts to those in the observations for (a) precipitation above 95P (blue) and 99p (red), (b) maximum 2m temperature above 95P (blue) and 99P (red) and (c) minimum 2m temperature below 5P (blue) and 1P (red). Note the different scales of the y-axis. The ratios were computed using all the forecasts initiated from 1st and 15th of each month during JJAS 2011–2017.