



Supplement of

An overview of the Western United States Dynamically Downscaled Dataset (WUS-D3)

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1980-2009 SSTs

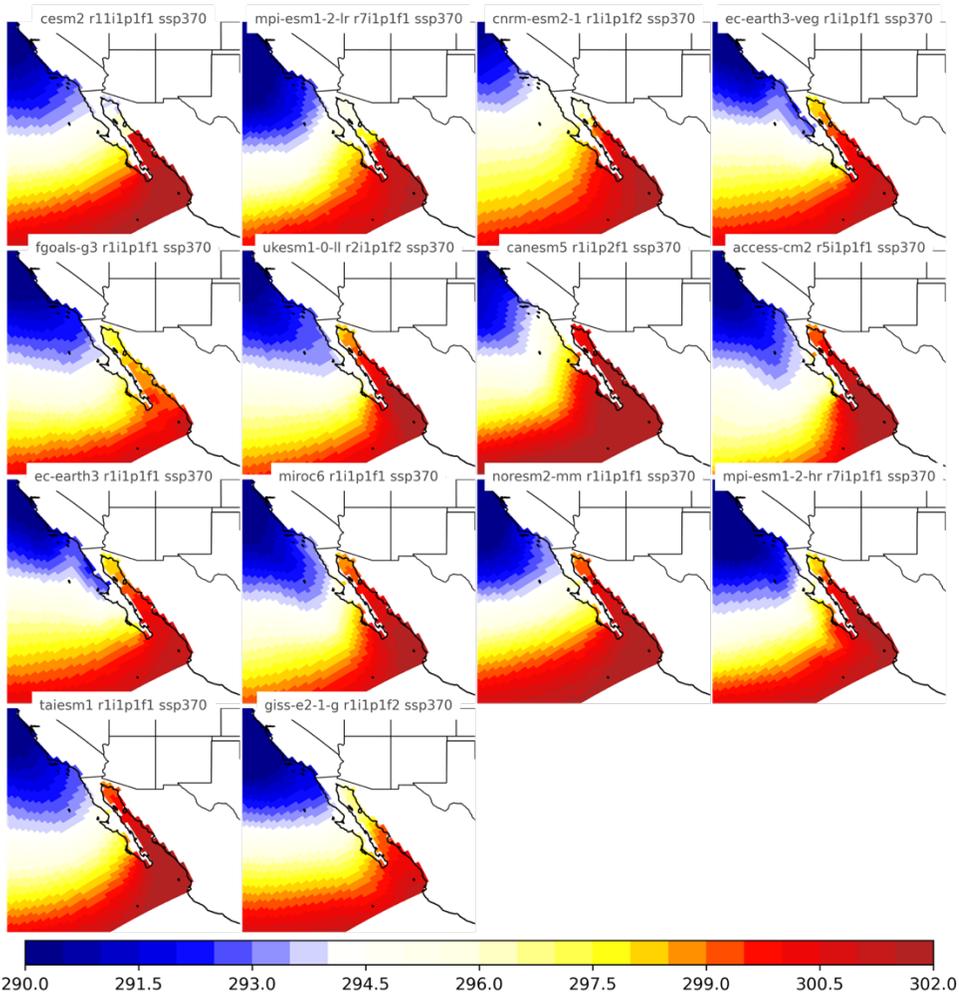


Figure S1. Annual-mean sea surface temperatures (SSTs; [K]) from 1980-2009 from 14 GCMs considered in this study

DJF surface air temperature bias

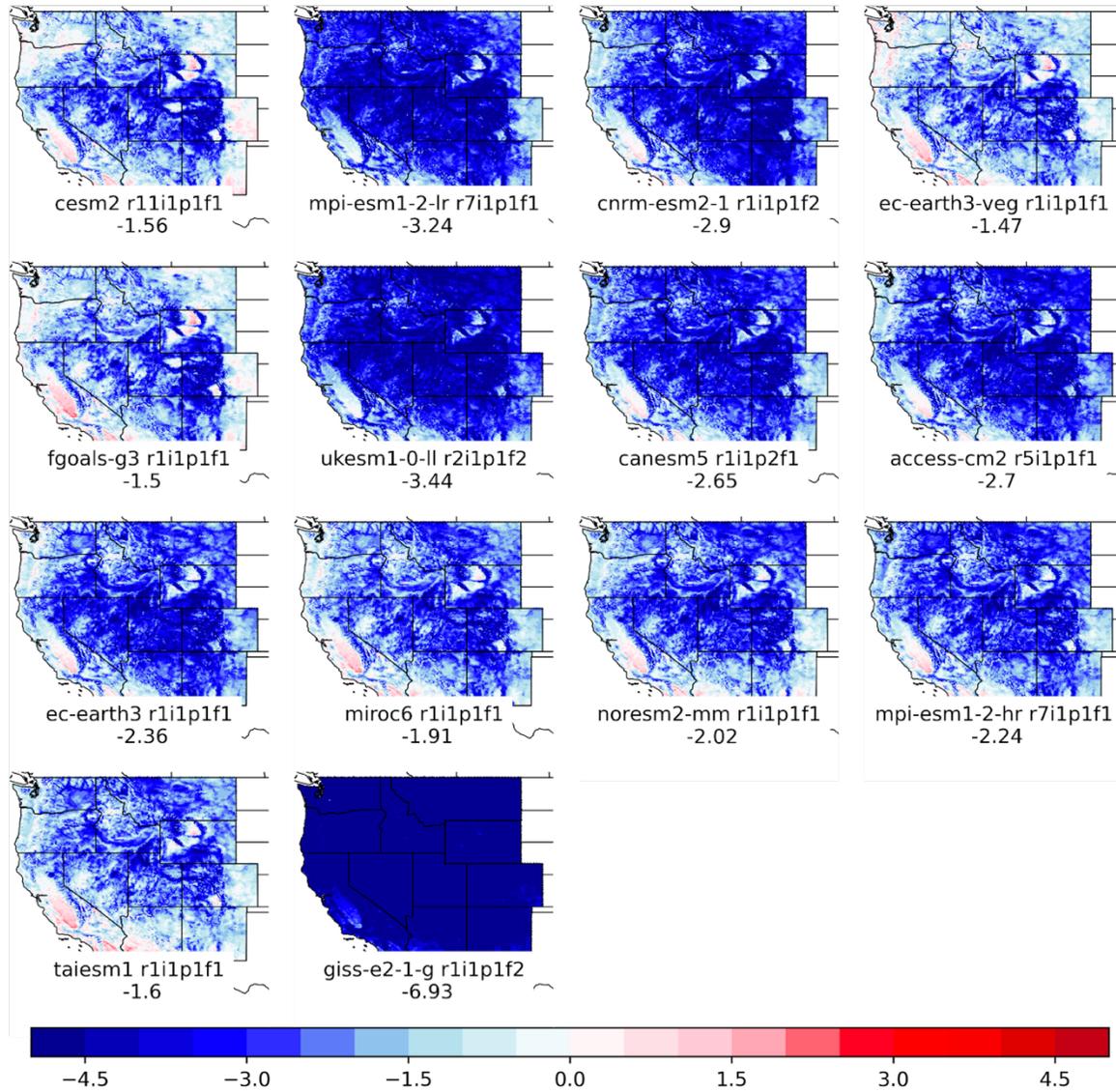


Figure S2. Wintertime (DJF) biases [K] in dynamically downscaled surface air temperature from 1981-2010 relative to PRISM. 11-state-mean biases are presented beneath each GCM label.

DJF precipitation bias

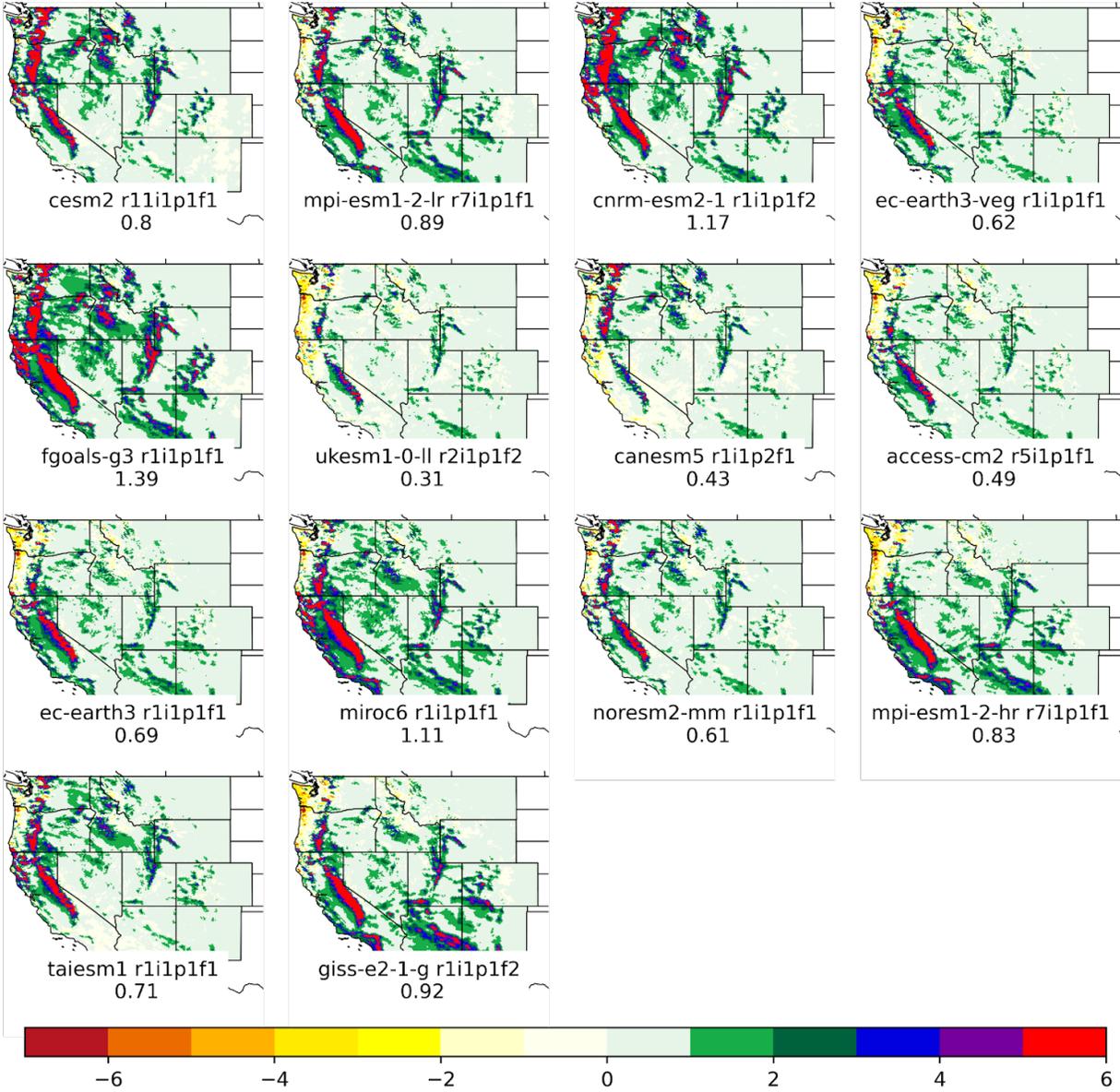


Figure S3. Same as in Fig. S2, but for precipitation rate [mm d⁻¹].

Climate response signals from GCM ensemble

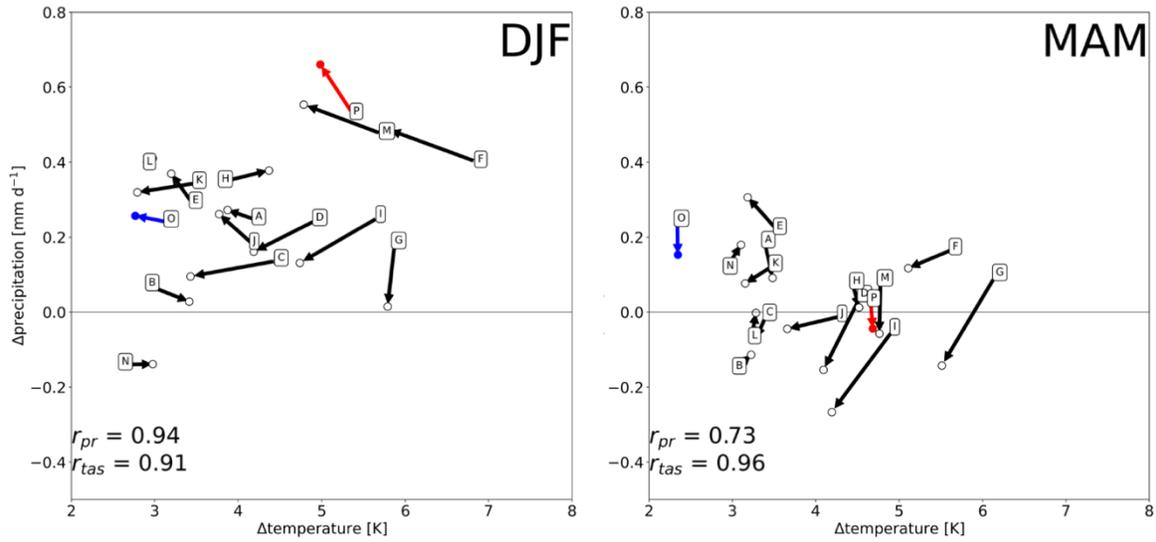


Figure S4. Future winter (DJF) and springtime (MAM) climate response for parent GCMs (indicated by lettering) and their downscaled counterparts (indicated by circles) on the 9-km WRF grid averaged across 11 western U.S. states (End-Century). Non-colored circles are for SSP3-7.0 projections only, while blue (red) circles represent the SSP2-4.5 (SSP5-8.5) projections. Arrows point away from parent GCMs towards downscaled counterparts.

Temperature change by EC

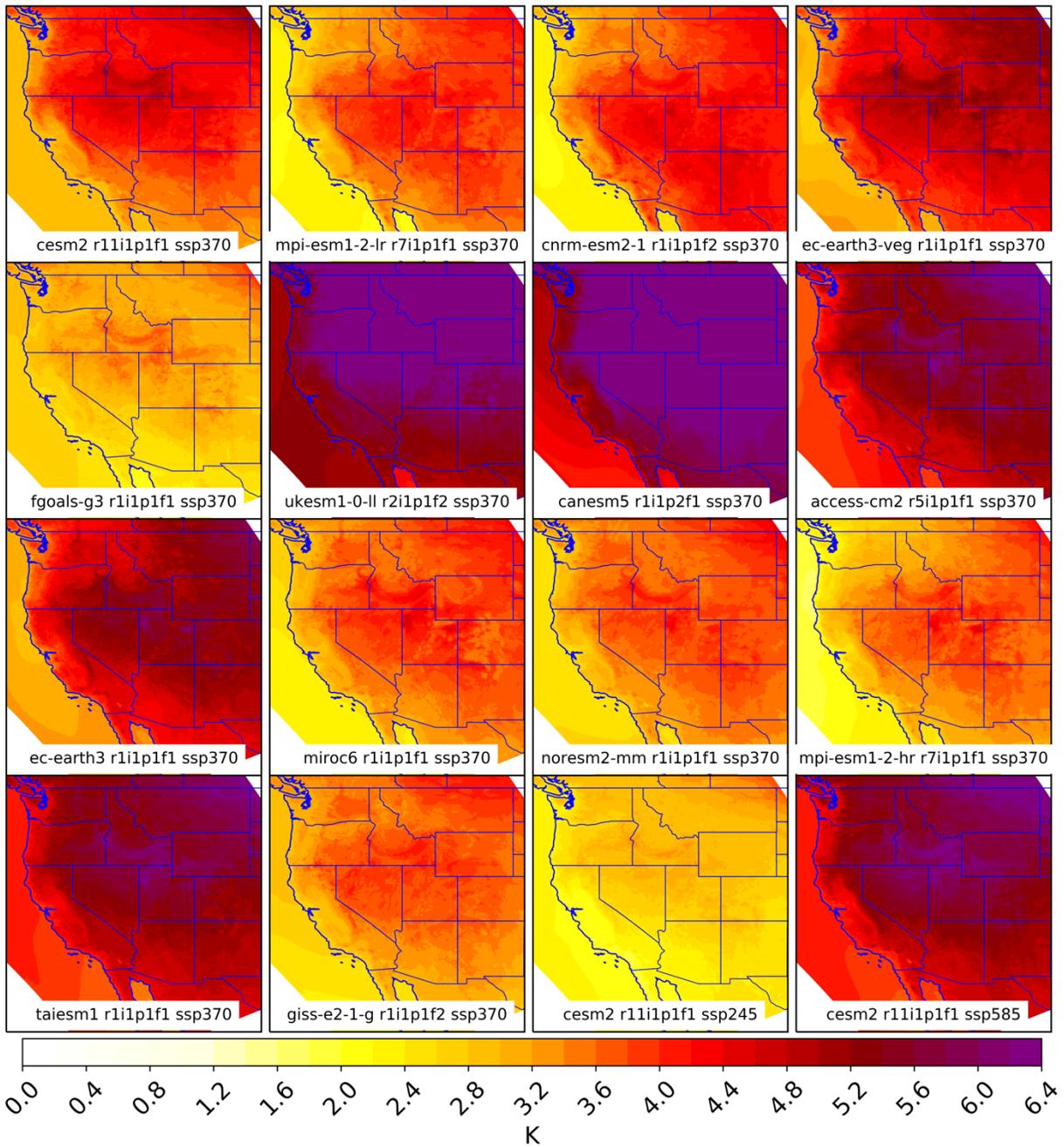


Figure S5. Changes in annual-mean surface air temperature [K] by the end-of-century (2070-2100) period.

Precipitation change by EC

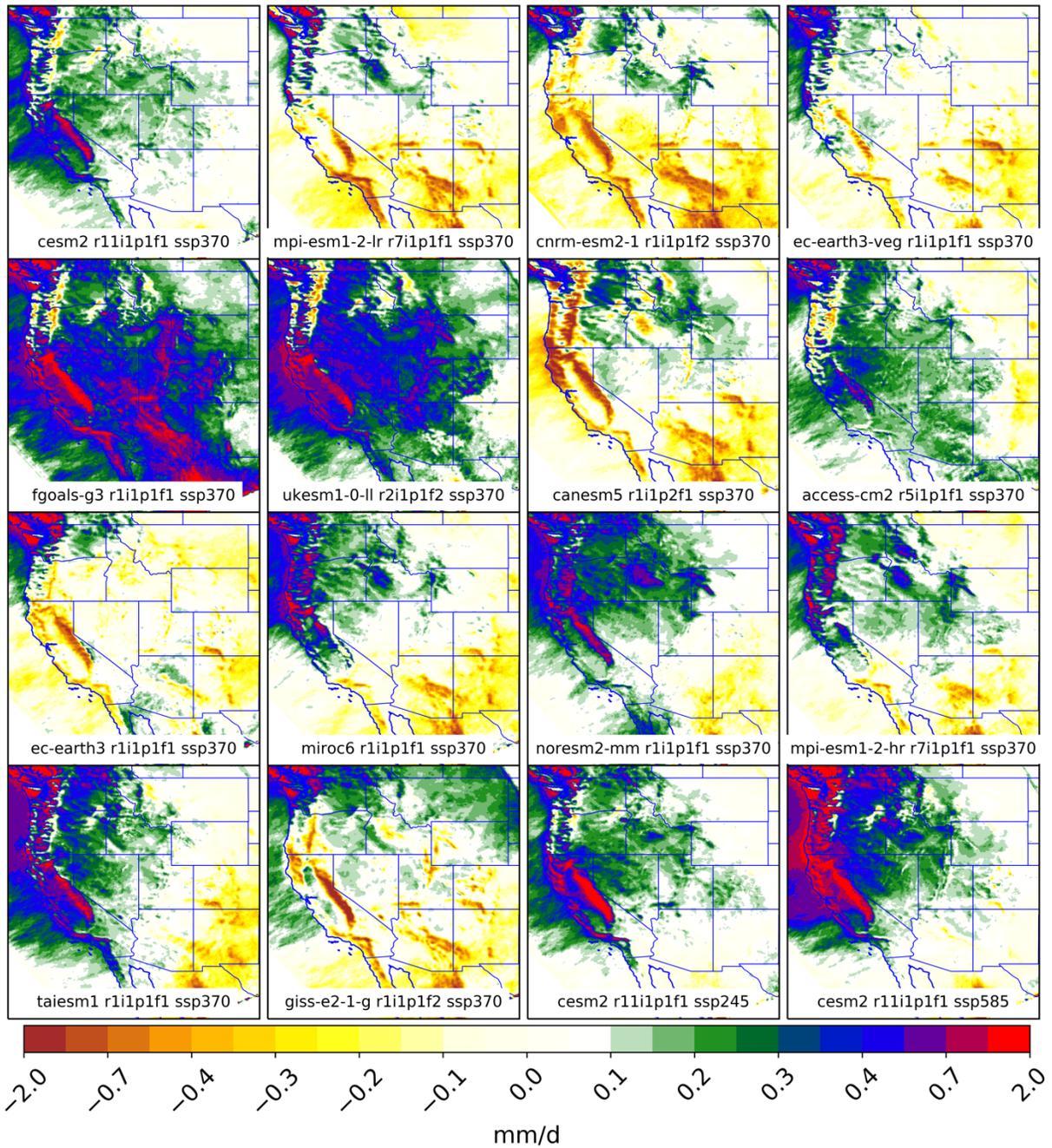


Figure S6. Same as in Fig. S5, but for precipitation [mm d⁻¹].

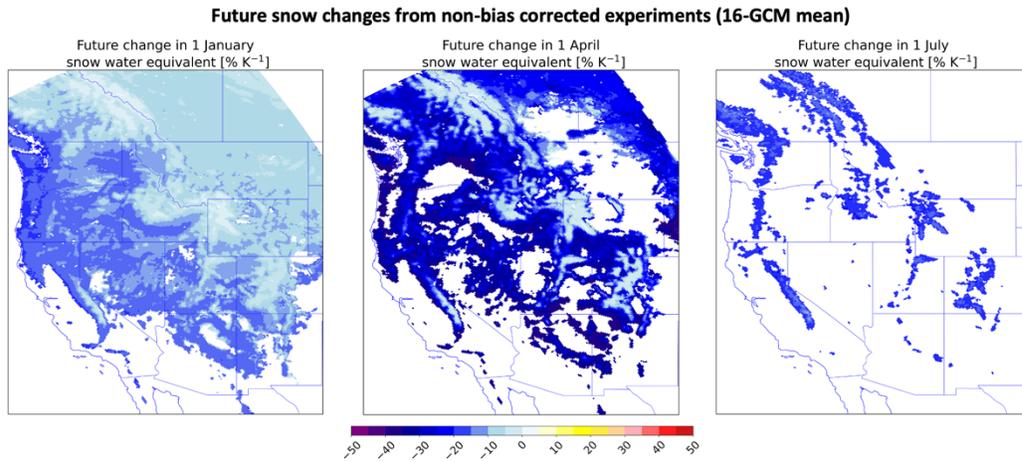


Figure S7. Future changes in 1 January (left), 1 April (middle), and 1 July (right) snow water equivalent normalized by the amount of global warming [% K⁻¹] in the 16-GCM mean.

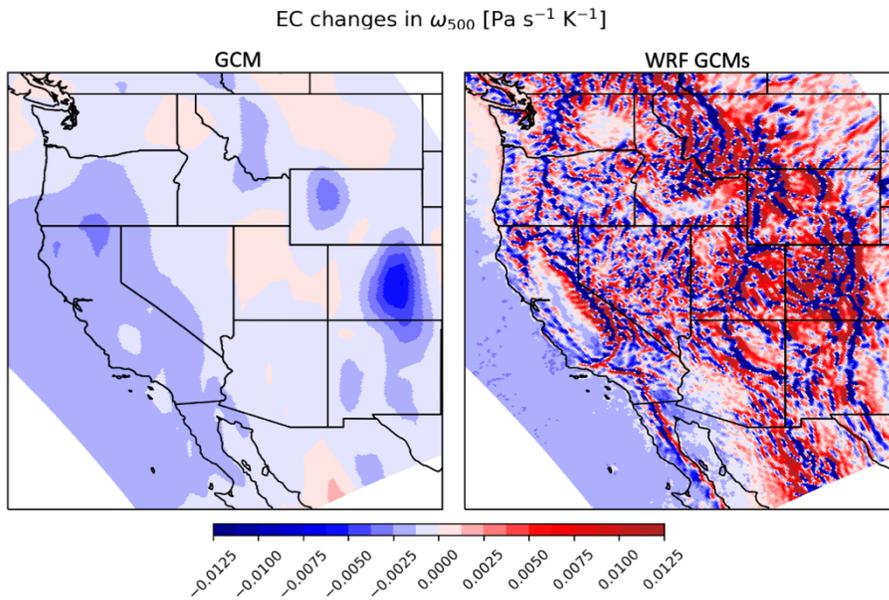


Figure S8. Ensemble-mean future changes in 500 hPa pressure velocity normalized by end-of-century (2070-2100) mean global warming [Pa s⁻¹ K⁻¹].

Fractional precipitation change from GCMs

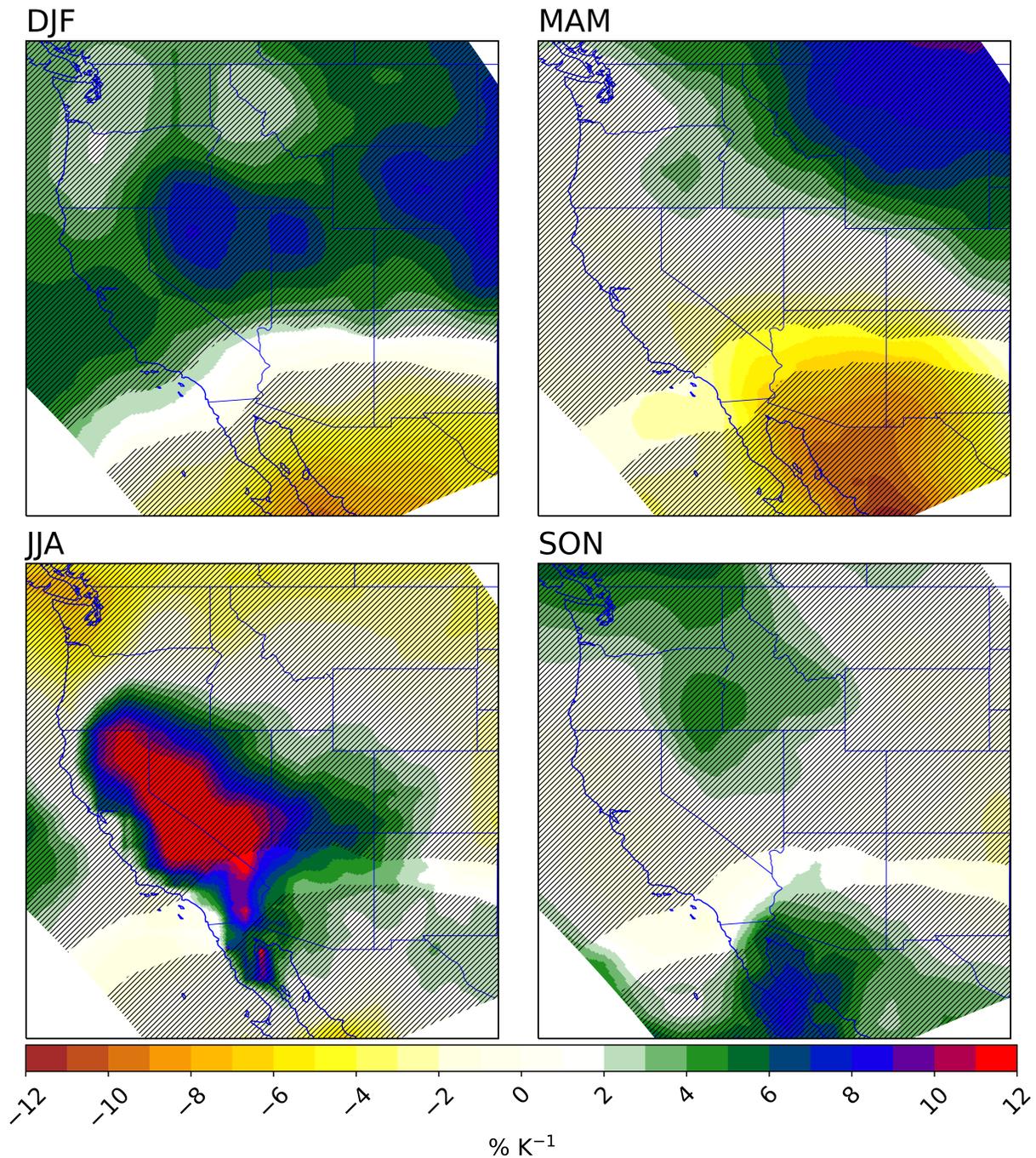


Figure S9. 16-GCM-mean future changes in native-GCM fractional precipitation normalized by the amount of global warming [$\% K^{-1}$]. Hatching indicates statistical significance to the 95% confidence interval when grid point distributions are subjected to a two-sided Student's t-test. Stippling is not included for temperature because every grid point returns a p value smaller than 0.05.

rx1 change by EC

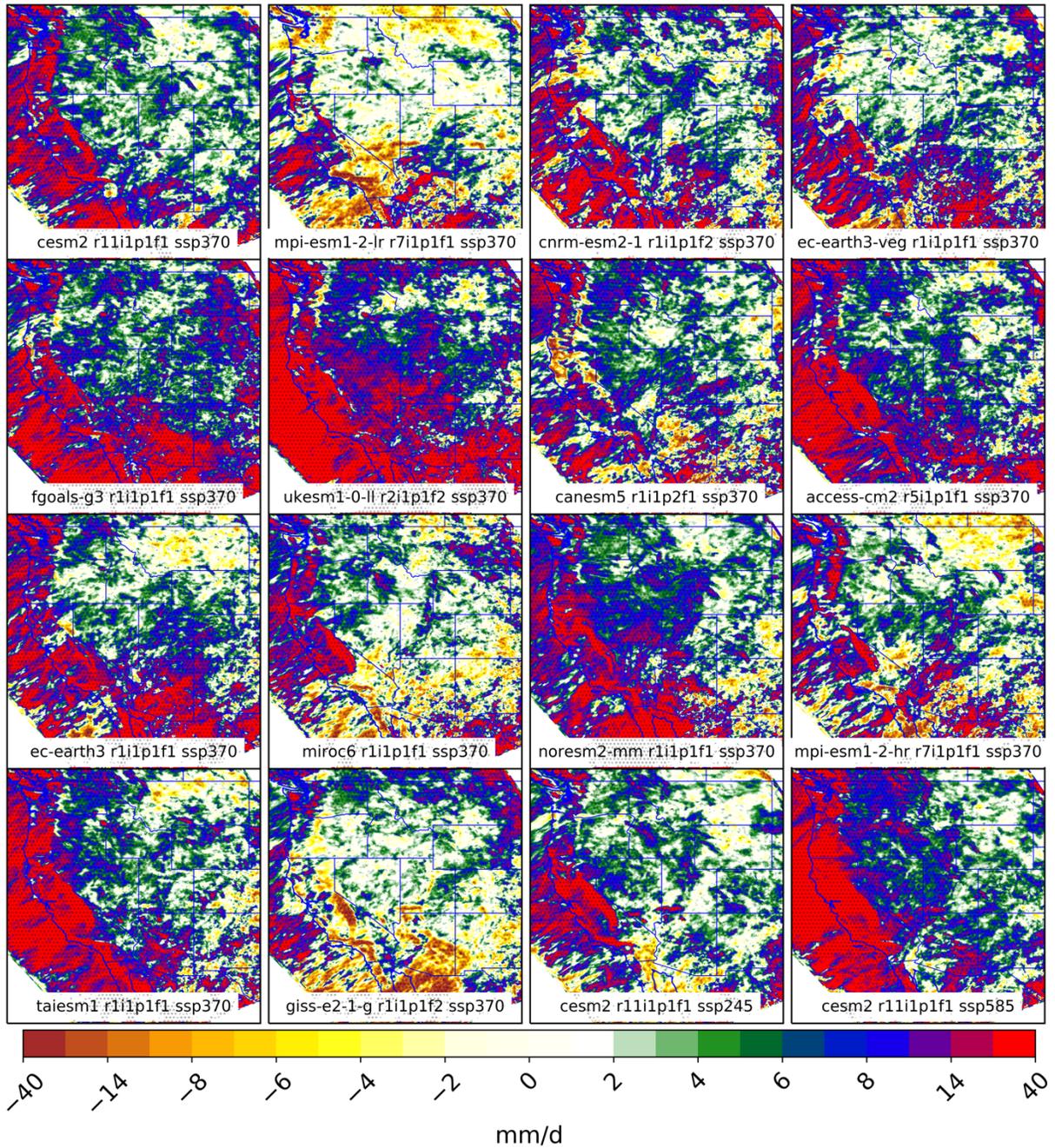


Figure 10. End-of-century (2070-2100) changes in rx1day precipitation [mm d⁻¹] for each GCM. Circles denote statistical significance to the 95% for a two-sided Student's t-test.

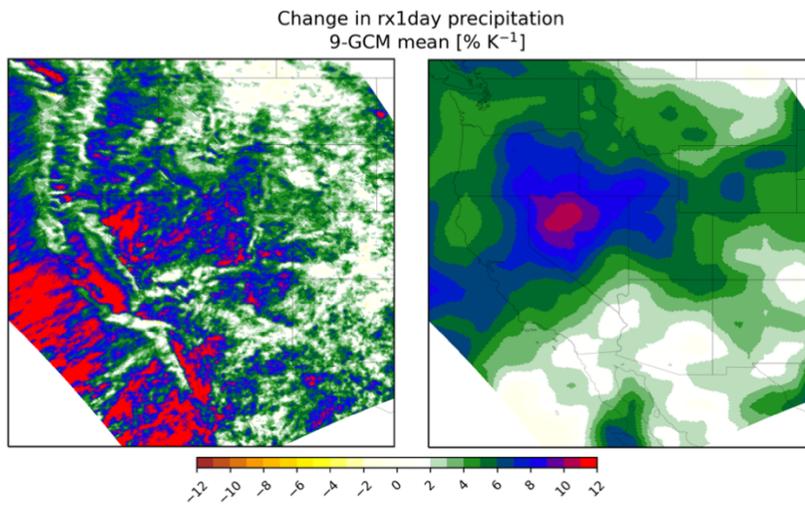


Figure S11. Future change in (left) WRF and (right) GCM rx1day precipitation [% K⁻¹] considering a 9-GCM mean.

Future changes in Tmax99 [#days/year/K]

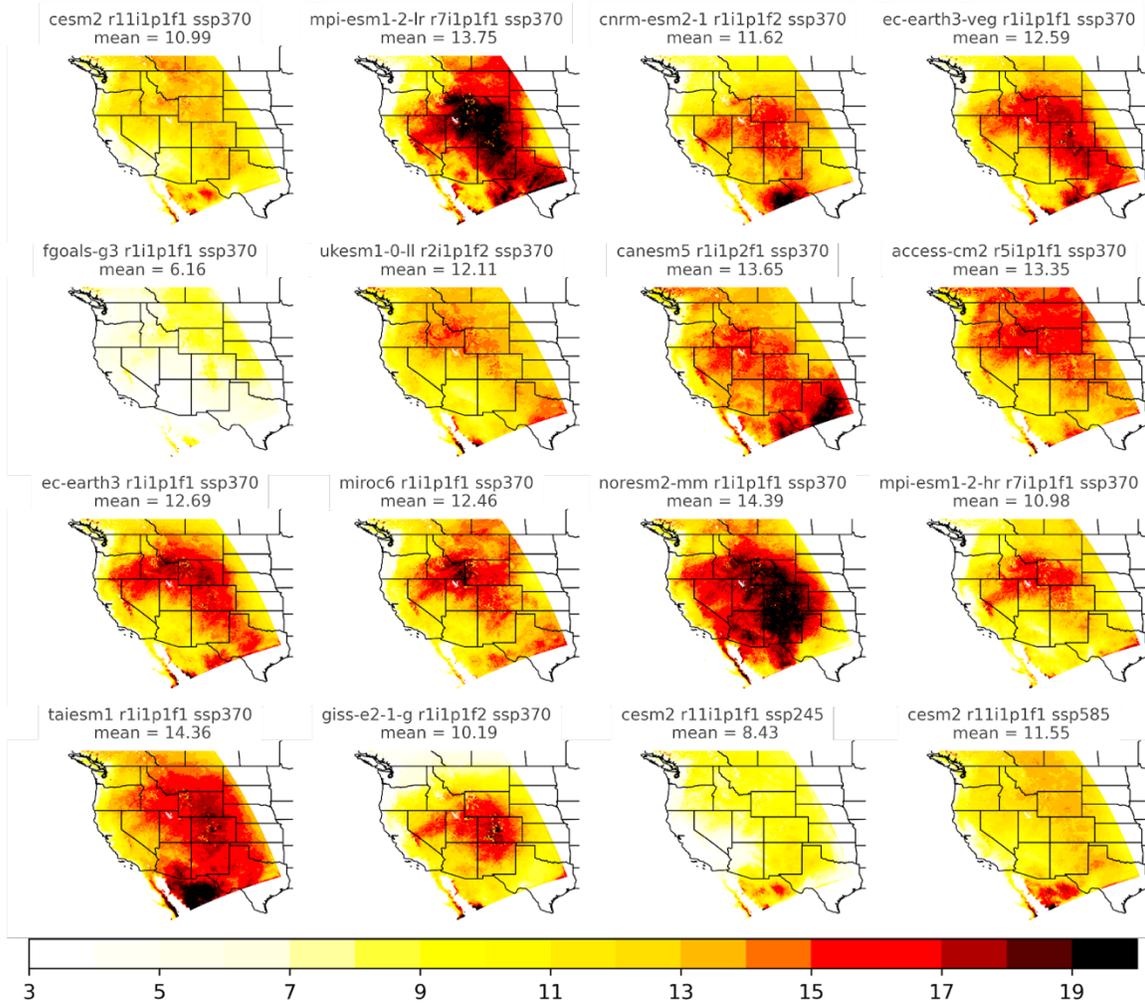


Figure S12. Future changes in maximum daily 99th percentile surface air temperature (Tmax99) per degree of global warming [$\text{days year}^{-1} \text{K}^{-1}$] for each downscaled GCM.

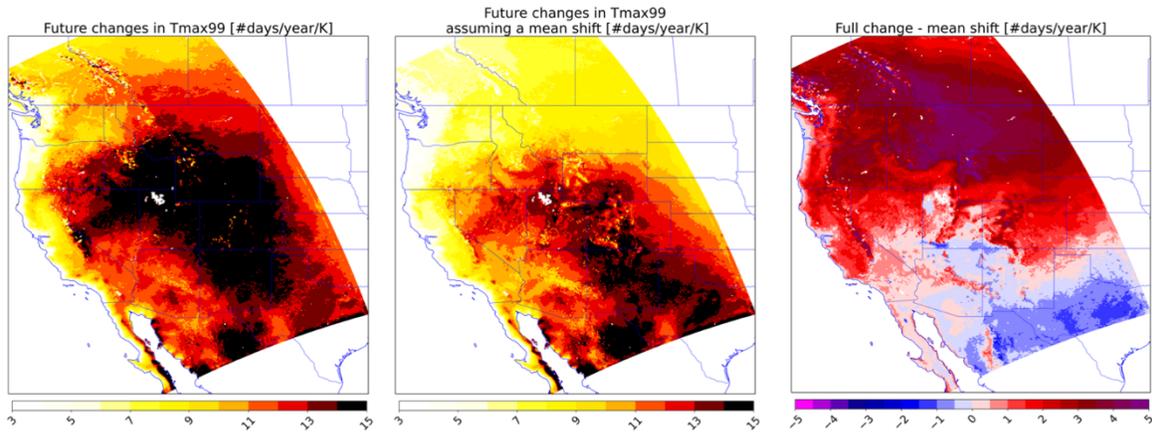


Figure S13. 11-GCM future changes in maximum daily 99th percentile surface air temperature (Tmax99) per degree of global warming [days year⁻¹ K⁻¹] considering the full change (left) and assuming a mean shift in the temperature distribution (middle). The right panel presents the difference between the left and center panels.