Supplementary Information for "Present and future trends of extreme short-term rainfall events in Germany, by downscaling convective environments of ERA5 and a CMIP6 ensemble"

by G. Bürger and M. Heistermann

S1 ERA5 and CMIP6 driving the trained classifiers

S1.1 ERA5

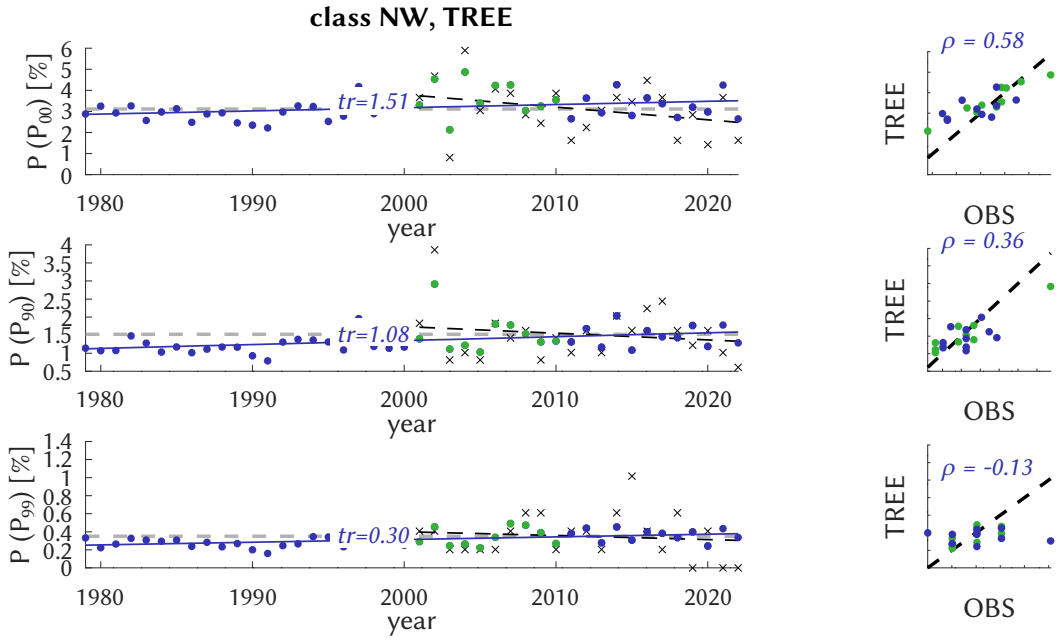

Figure S1. Like Fig. 6, for the NW class.

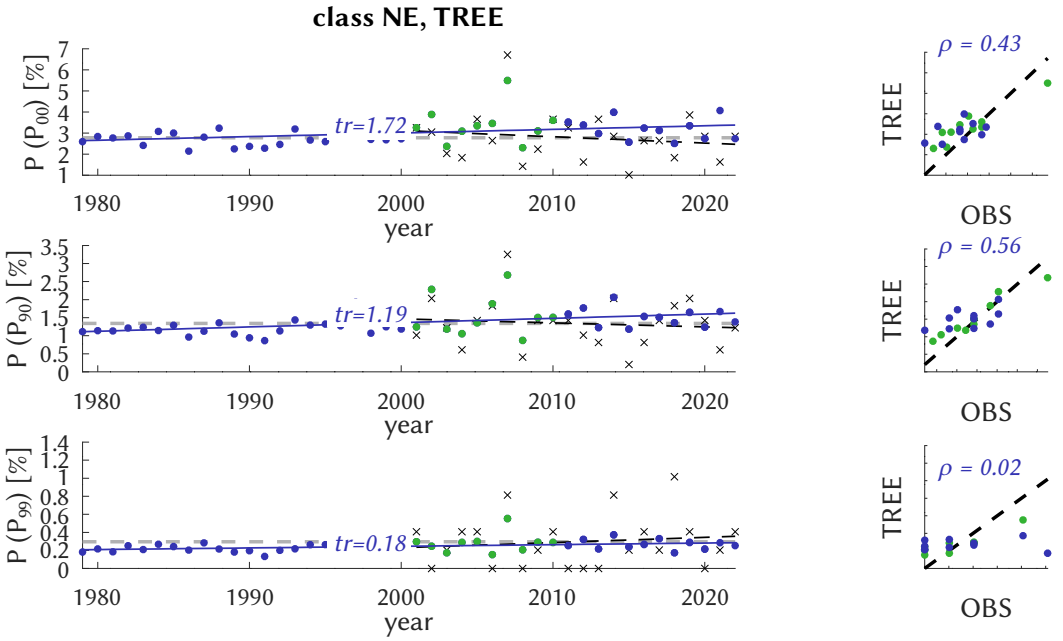

Figure S2. Like Fig. 6, for the NE class.

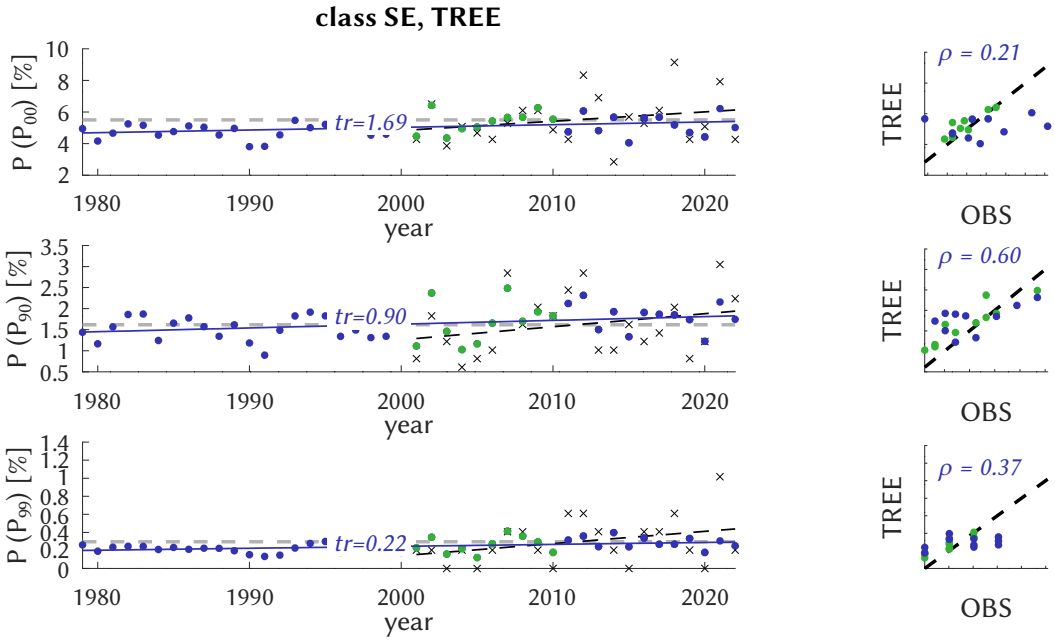

Figure S3. Like Fig. 6, for the SE class.

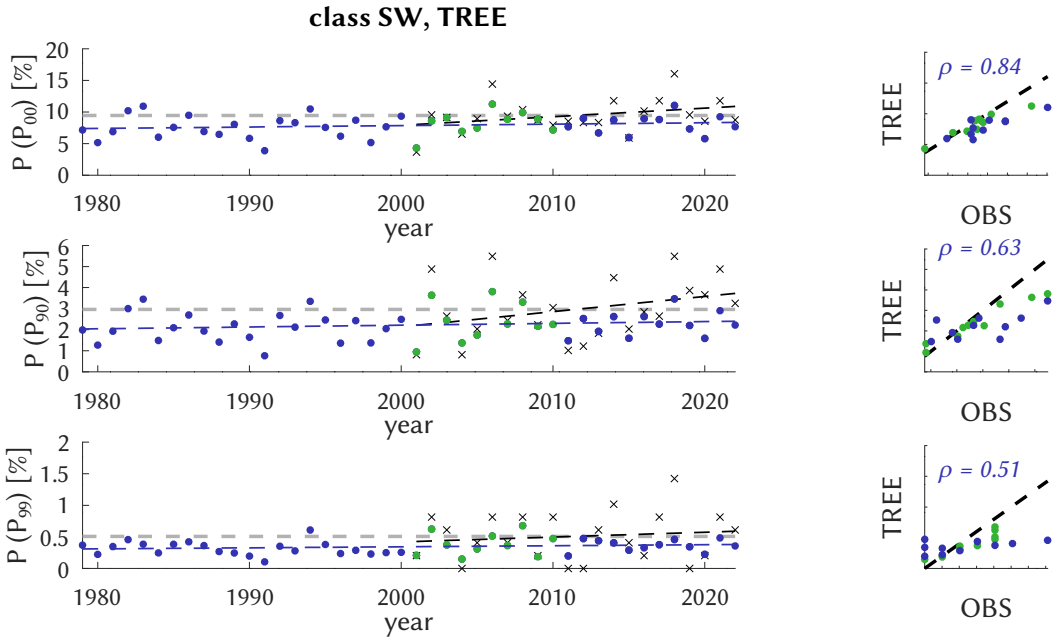

Figure S4. Like Fig. 6, for the SW class.

S1.2 CMIP6

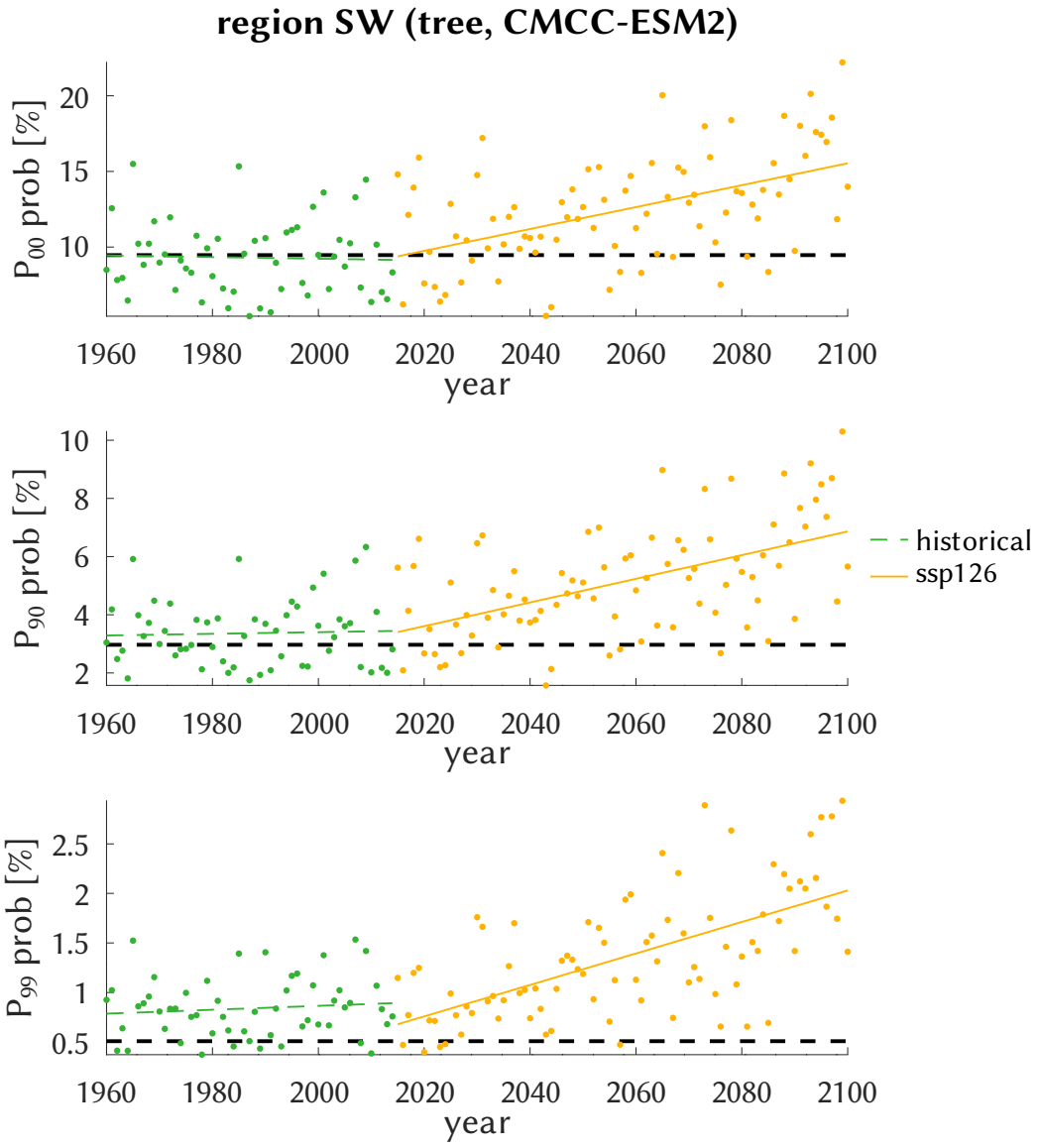

Figure S5. Like Fig. 7, based on the climate model CMCC-ESM2.

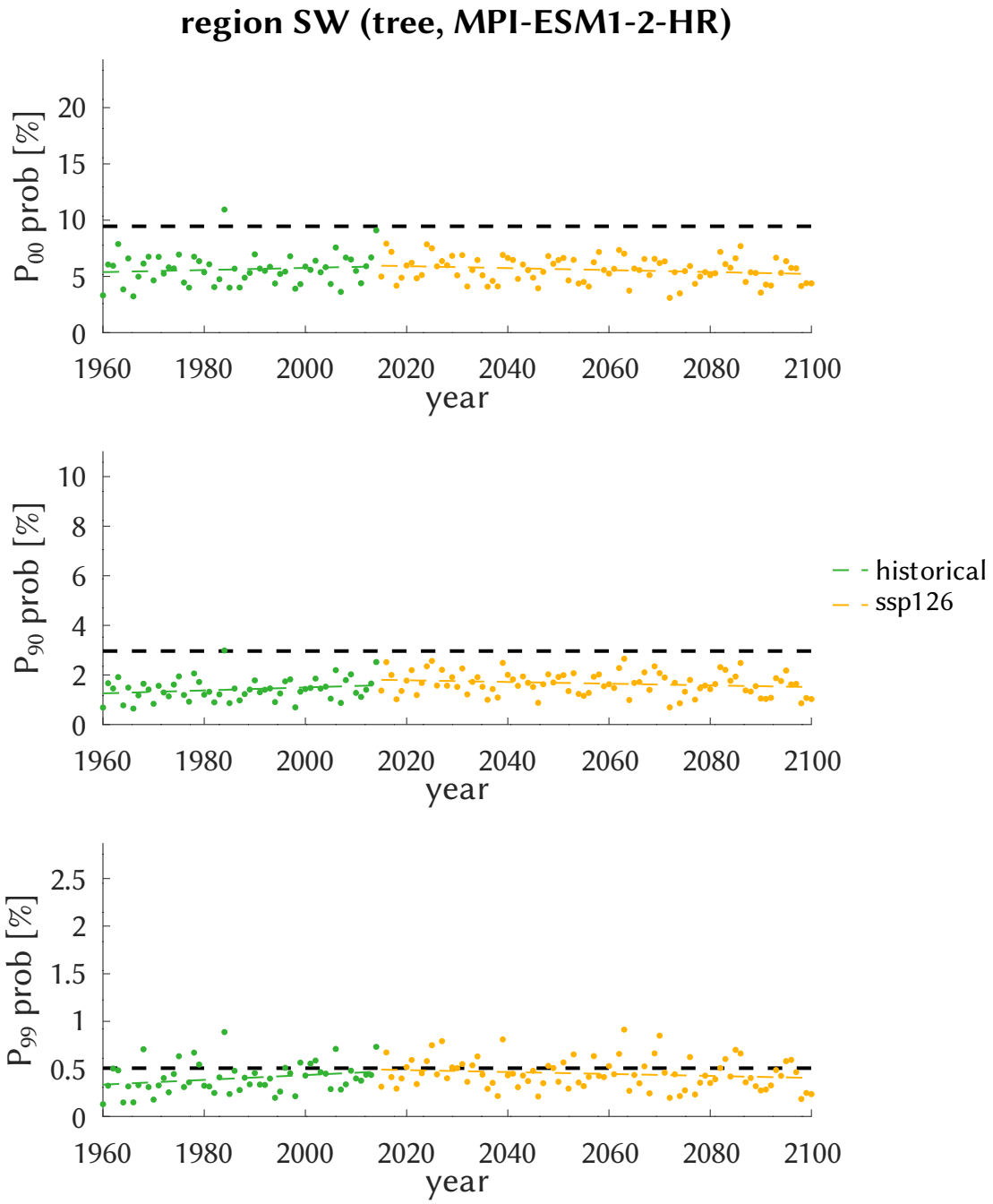

Figure S6. Like Fig. 7, for the r1 realization of MPI-ESM1-2-HR.

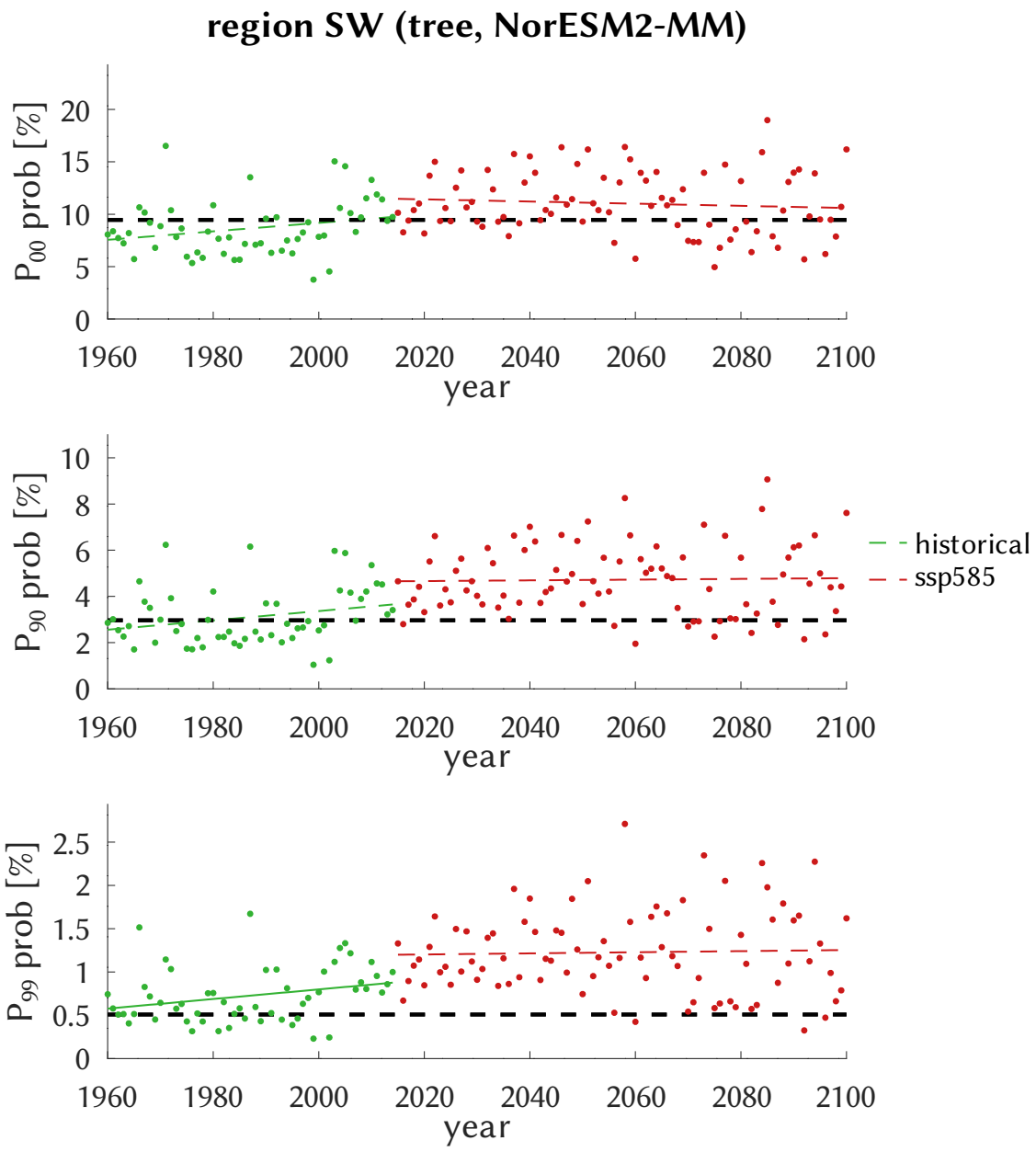

Figure S7. Like Fig. 7, for NorESM2-MM.

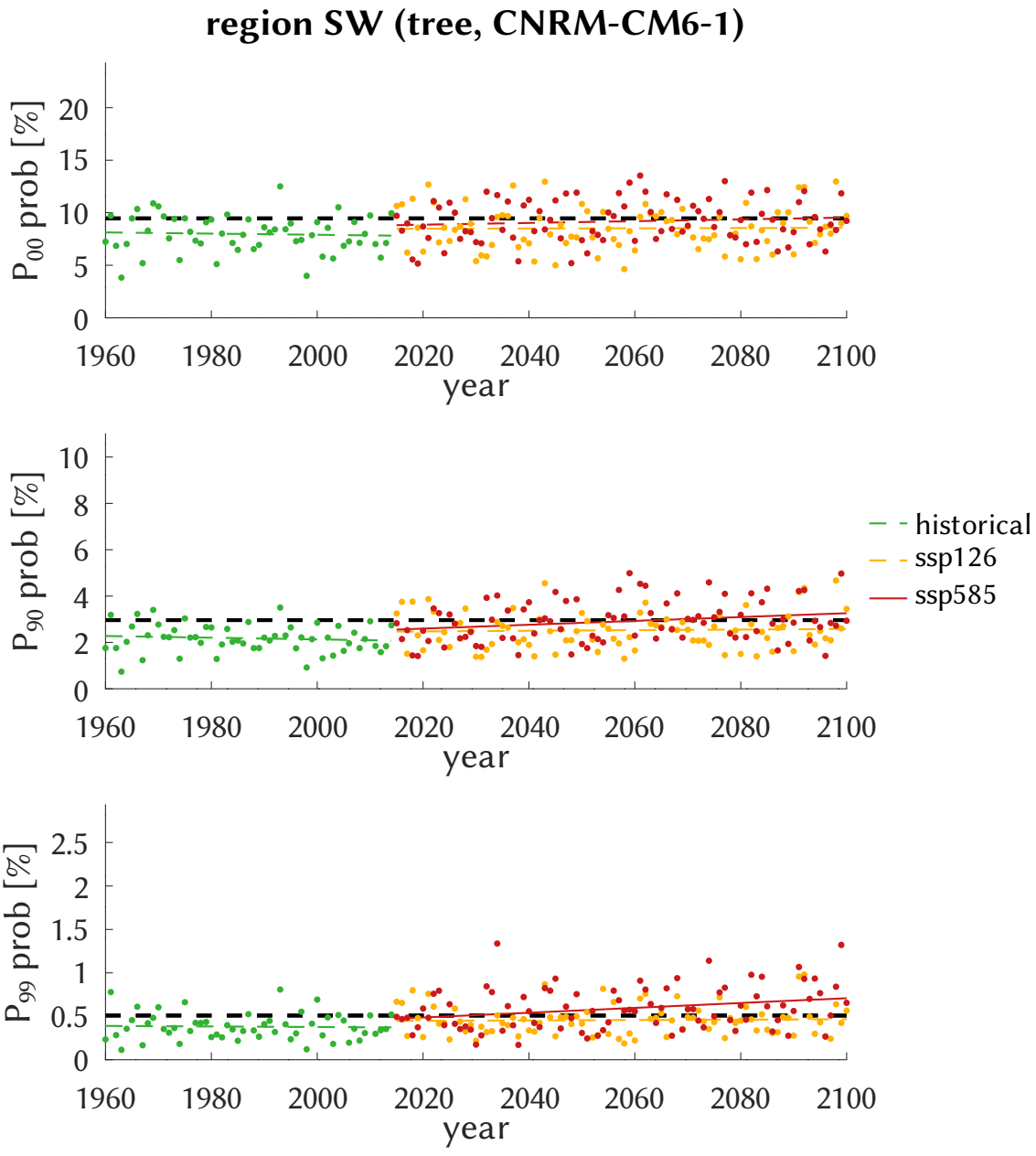

Figure S8. Like Fig. 7, for CNRM-CM6-1.

S1.3 Normalized drivers

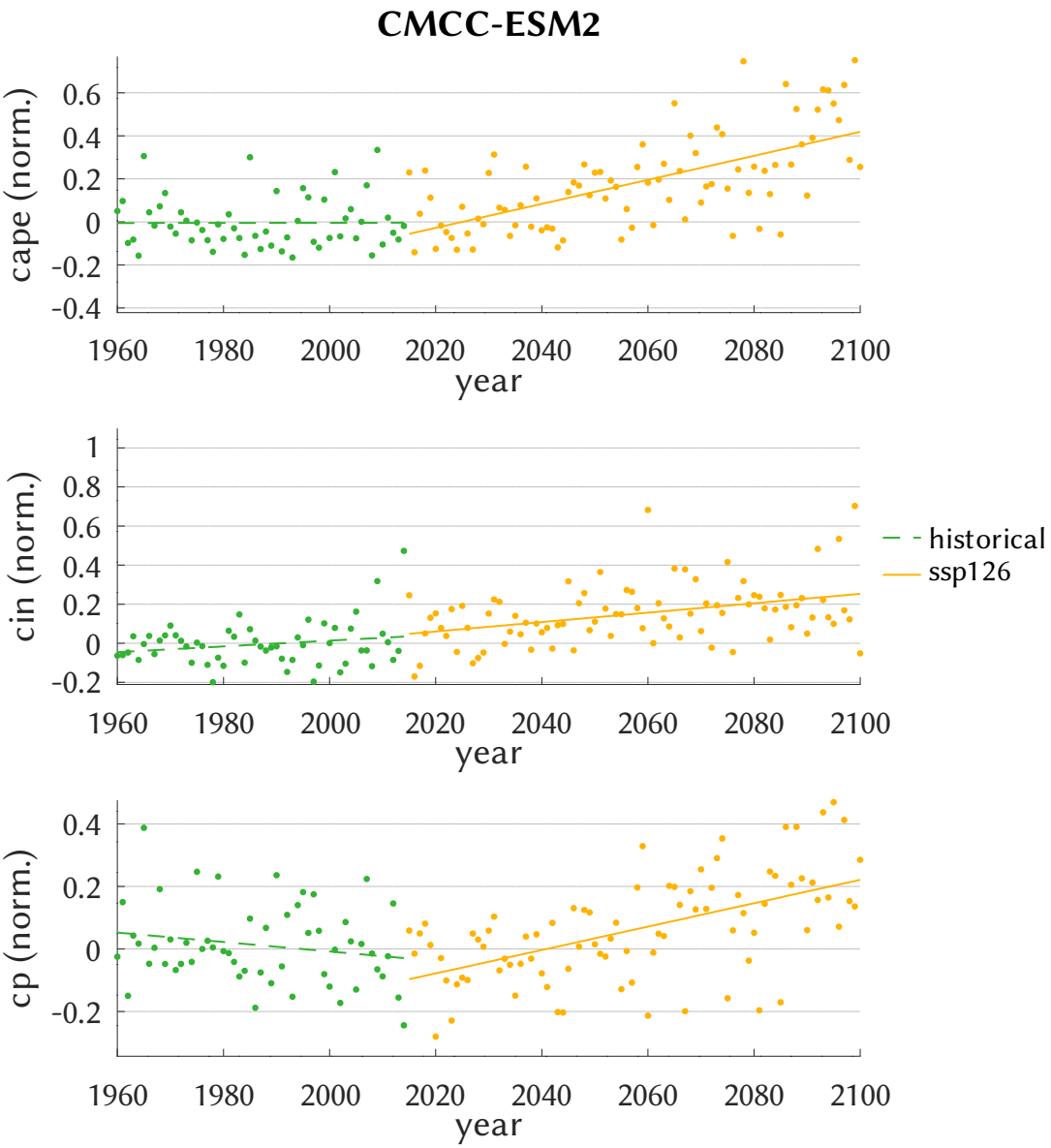

Figure S9. Like Fig. 8, for CMCC-ESM2.

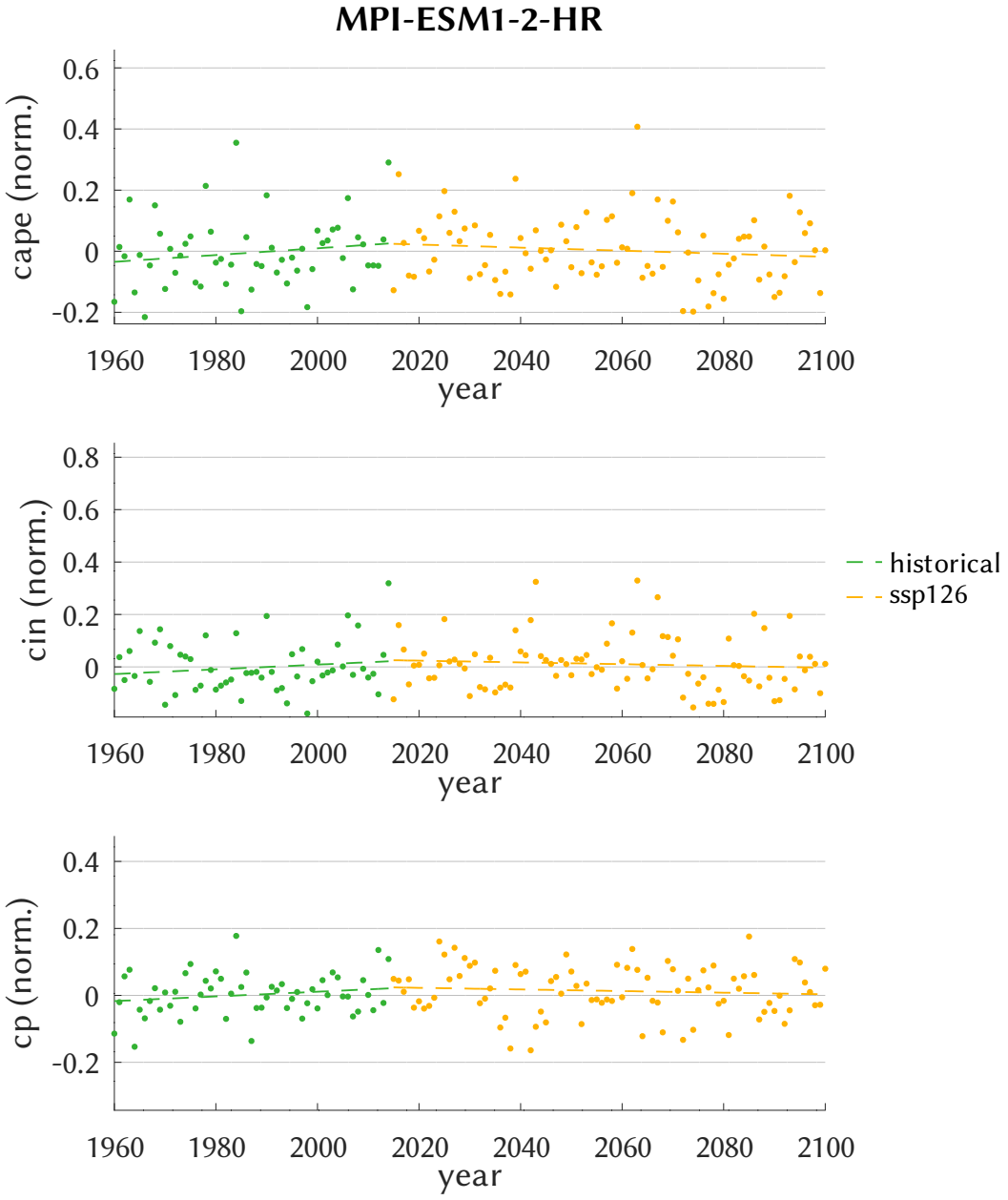

Figure S10. Like Fig. 8, for the r1 realization of MPI-ESM1-2-HR.

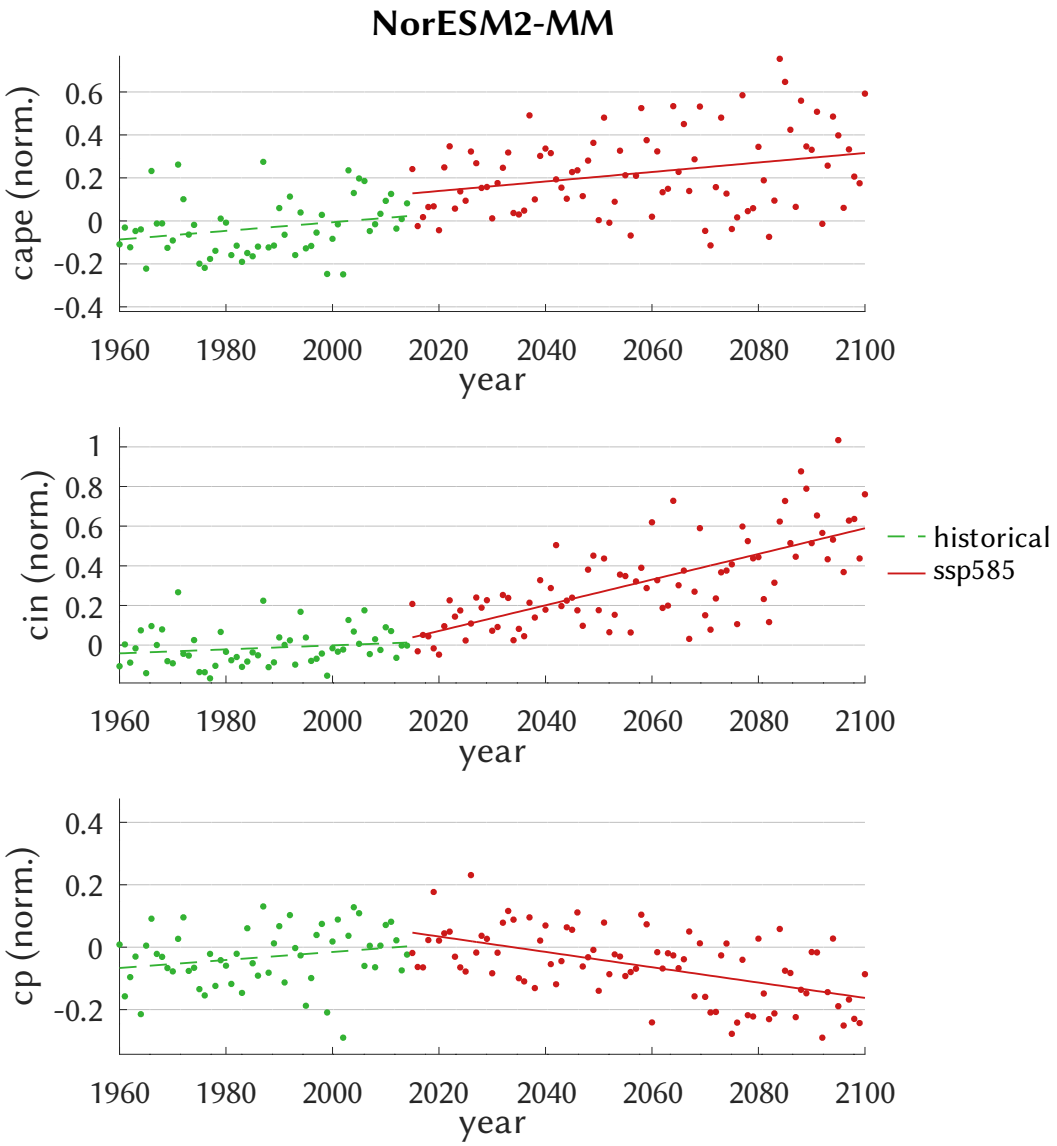

Figure S11. Like Fig. 8, for NorESM2-MM.

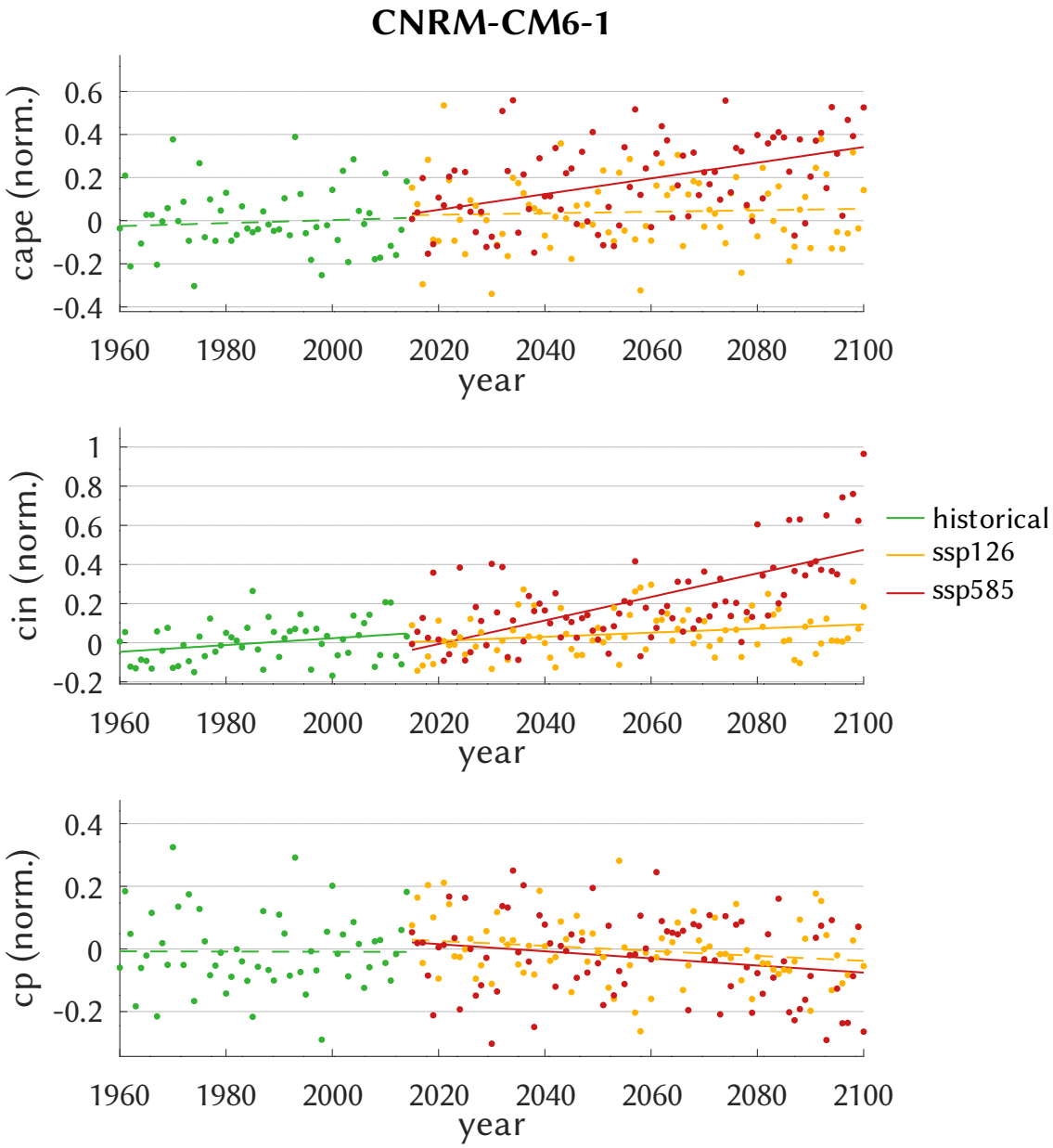

Figure S12. Like Fig. 8, for CNRM-CM6-1.

S2 Distribution and ANOVA of the simulated trends

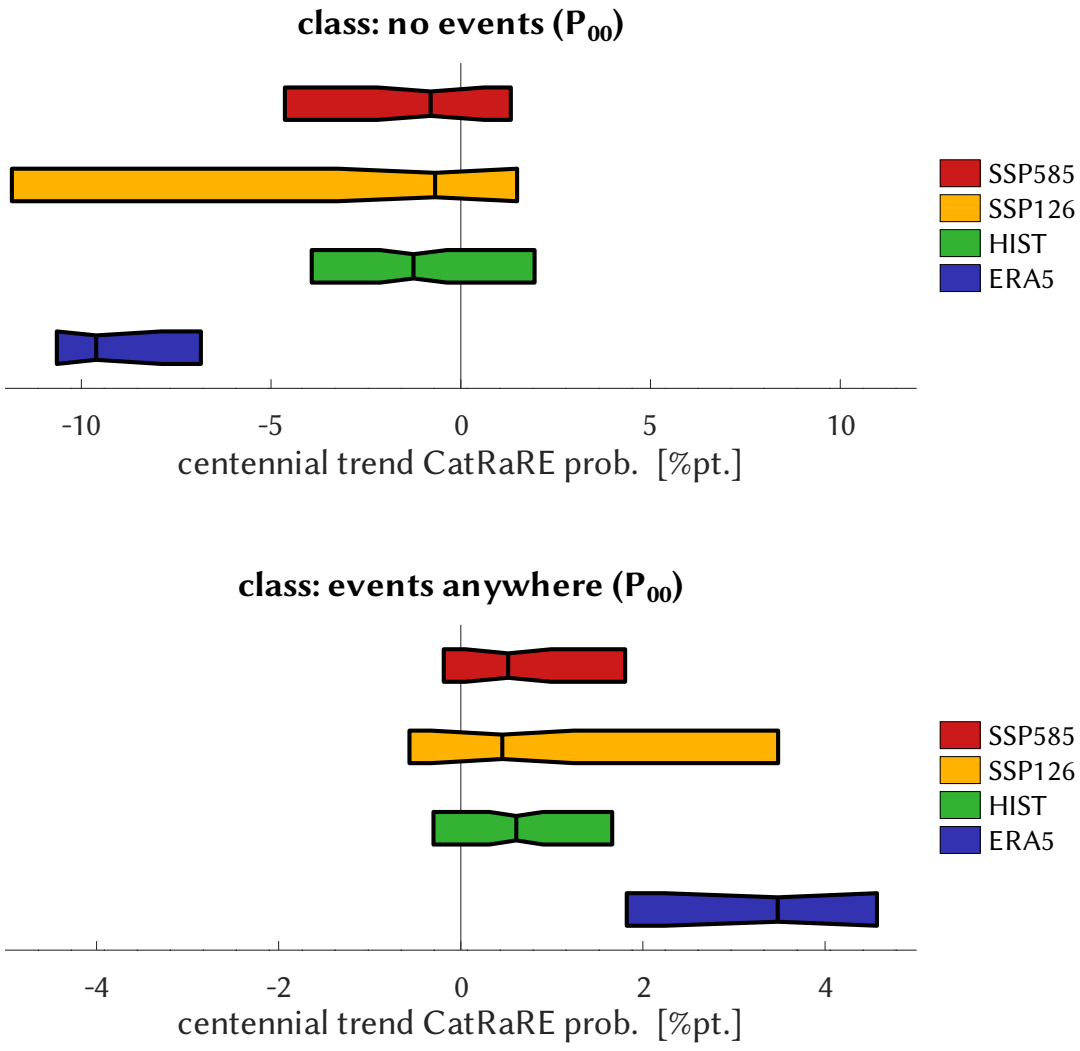

Figure S13. As Fig. 9, for the P_{00}-class.

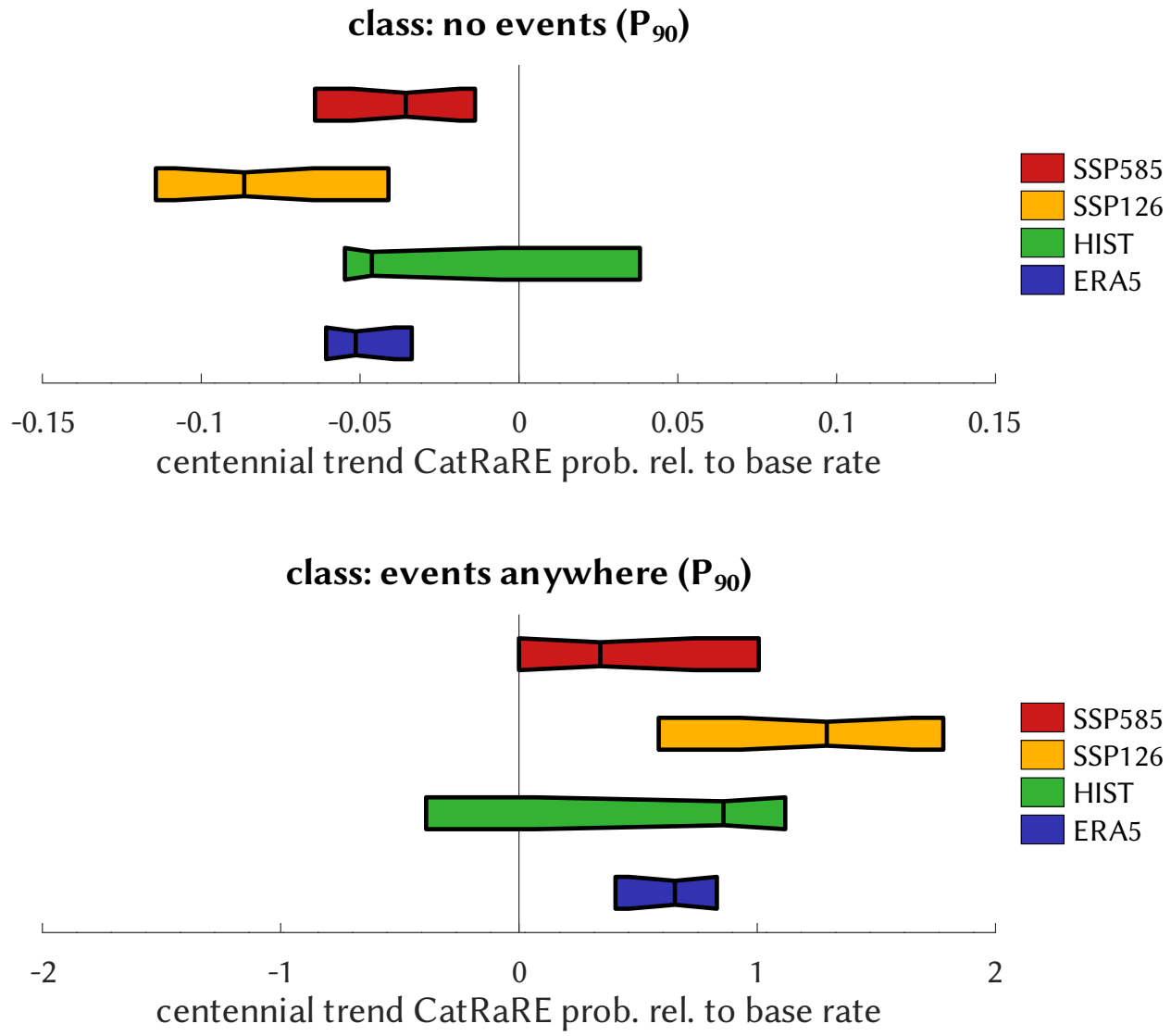

Figure S14. Similar to Fig. 9, confined to significant trends.

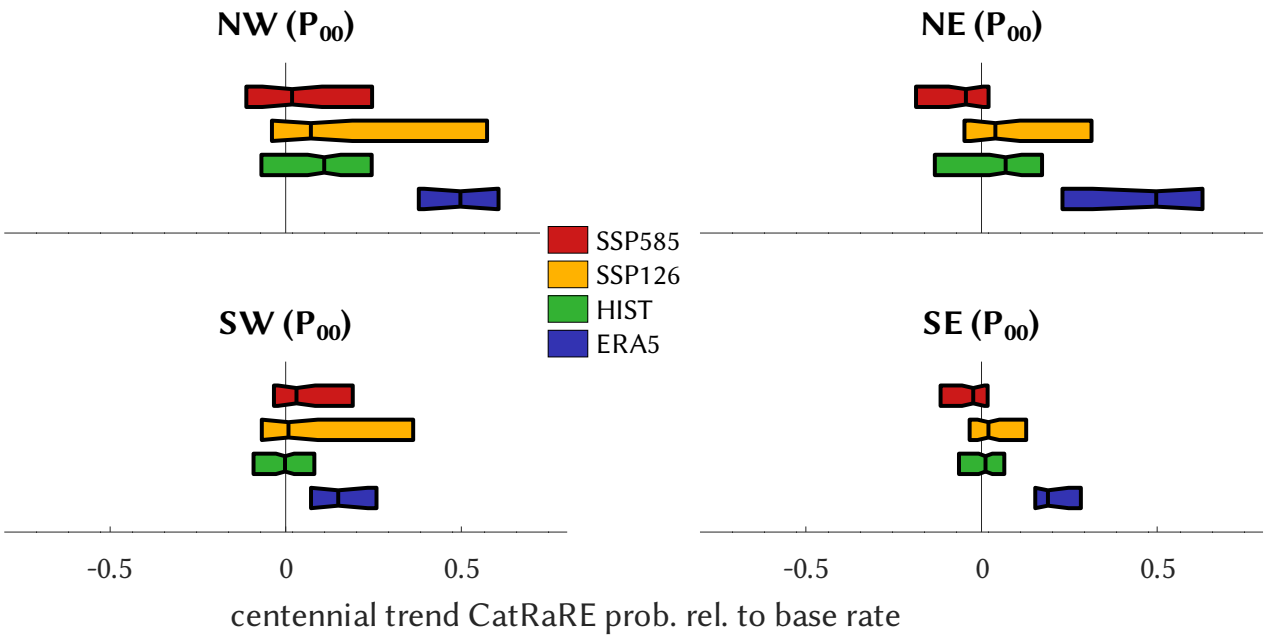

Figure S15. Like Fig. 10 for P_{00}.

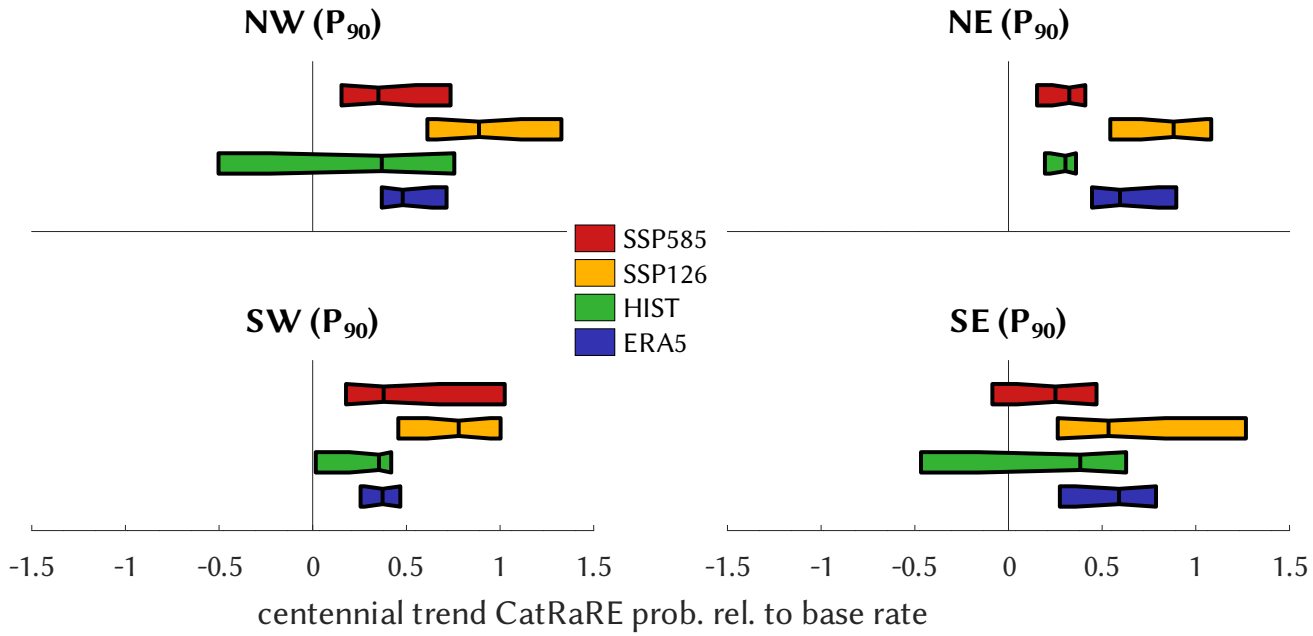

Figure S16. As Fig. 10, confined to significant trends.

S3 The relation between driver and CatRaRE trends

We finally check whether we can find any interrelationships between the trends of the driving atmospheric convective environments (*cape, cin, cp*) and the obtained CatRaRE-type events. Table 1 lists the corresponding correlations across all regions and severity classes. First of all, the strong positive correlation between *cape* and *cin* is apparent, demonstrating the simultaneous growth for the two antagonistic drivers for future convectivity (Chen et al., 2020; Lepore et al., 2021; Taszarek et al., 2021). The positive and negative correlations between *cp* on the one hand and *cape* and *cin*, respectively, on the other should hold per definitionem. It is unclear why it does not hold for CatRaRE which shows a positive, albeit negligible, correlation to *cin*.

Table S1. Correlations between centennial trends of convective environments and CatRaRE

	cape	***cin***	***cp***	**CatRaRE**
cape	*1*	*0.69*	*0.44*	*0.51*
cin		*1*	*-0.28*	*0.15*
cp			*1*	*0.50*
CatRaRE				*1*