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Supplement of

Variability of surface climate in simulations of past and future

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Supplementary Figures

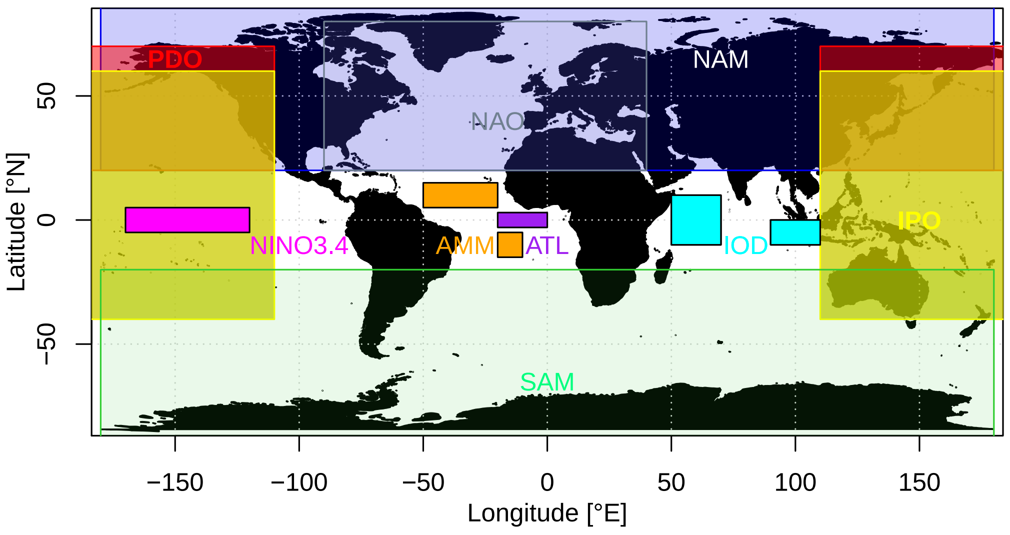

Figure S1. Areas considered in the calculation of the modes of variability (Sect. 2 in the manuscript).

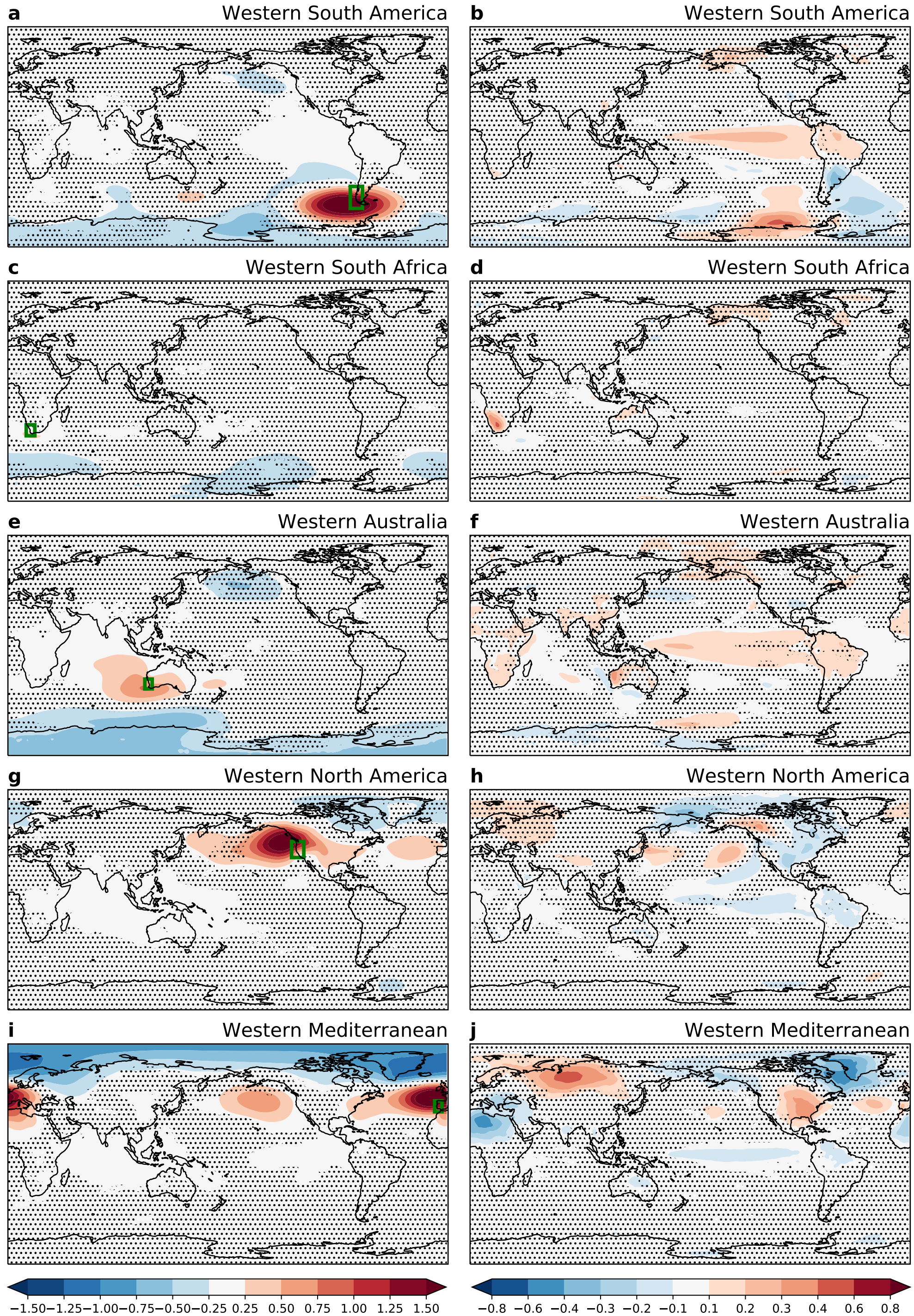

Figure S2. As in Fig. 5, sea-level pressure (in hPa) and surface air temperature (in $^{\circ}$C) anomaly composites for years of anomalously *low* precipitation in five regions with Mediterranean climates (indicated by green boxes on the left-hand panels). Sea-level pressure anomaly composites (panels a,c,e,g,i on the left) and surface air temperature anomaly composites (panels b,d,f,h,j on the right) show the large-scale patterns across models and experiments composited over years of anomalously low precipitation (defined as one standard deviation below the average) in each region. Stippling shows areas wherein fewer than two-thirds of the simulations agree on the sign of the pattern.

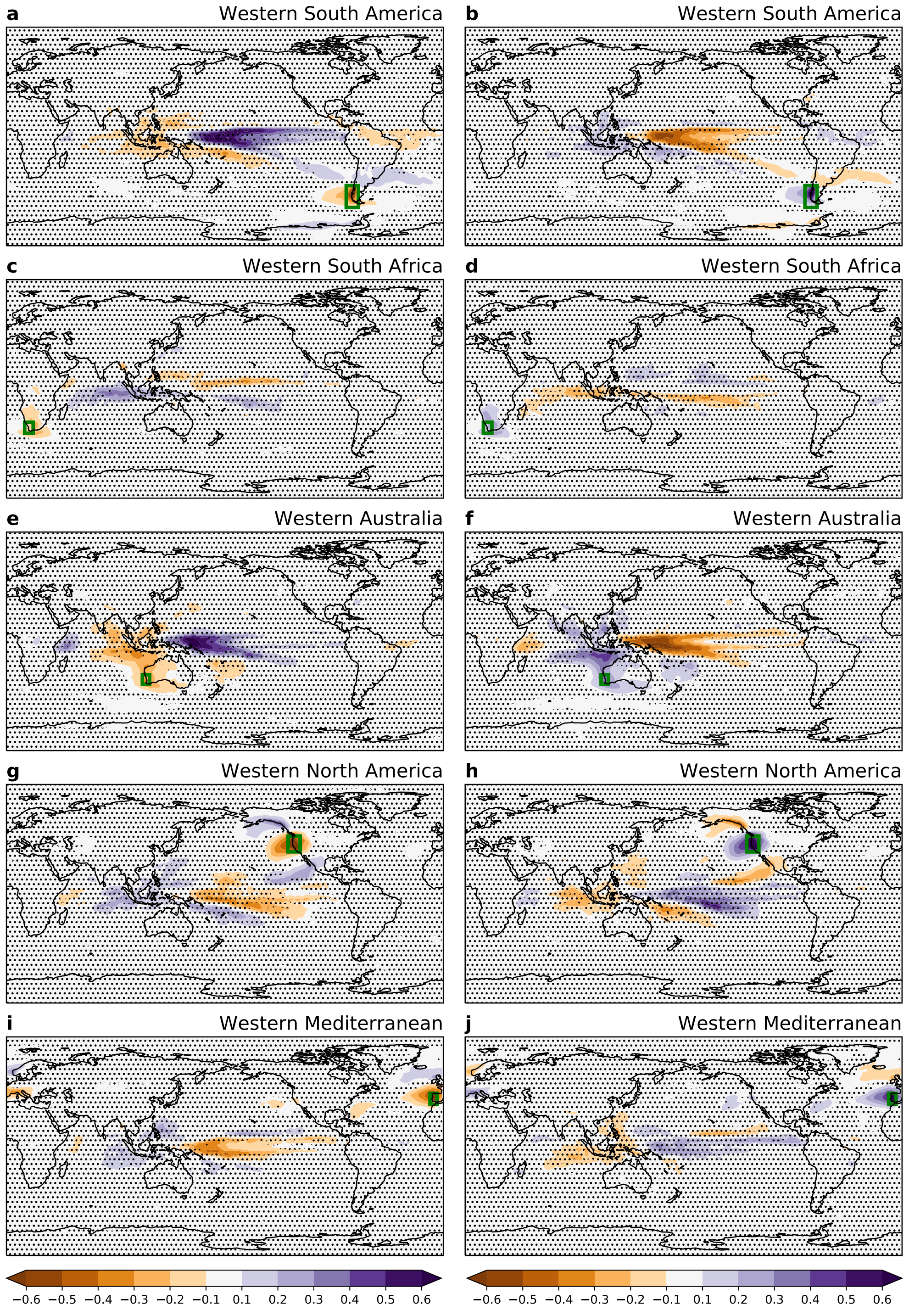

Figure S3. Composite of the precipitation anomalies (in mm/day) associated with low precipitation (left) and high precipitation (right) extremes in five regions with Mediterranean climates as in SF 2 and Fig. 5 in the manuscript.

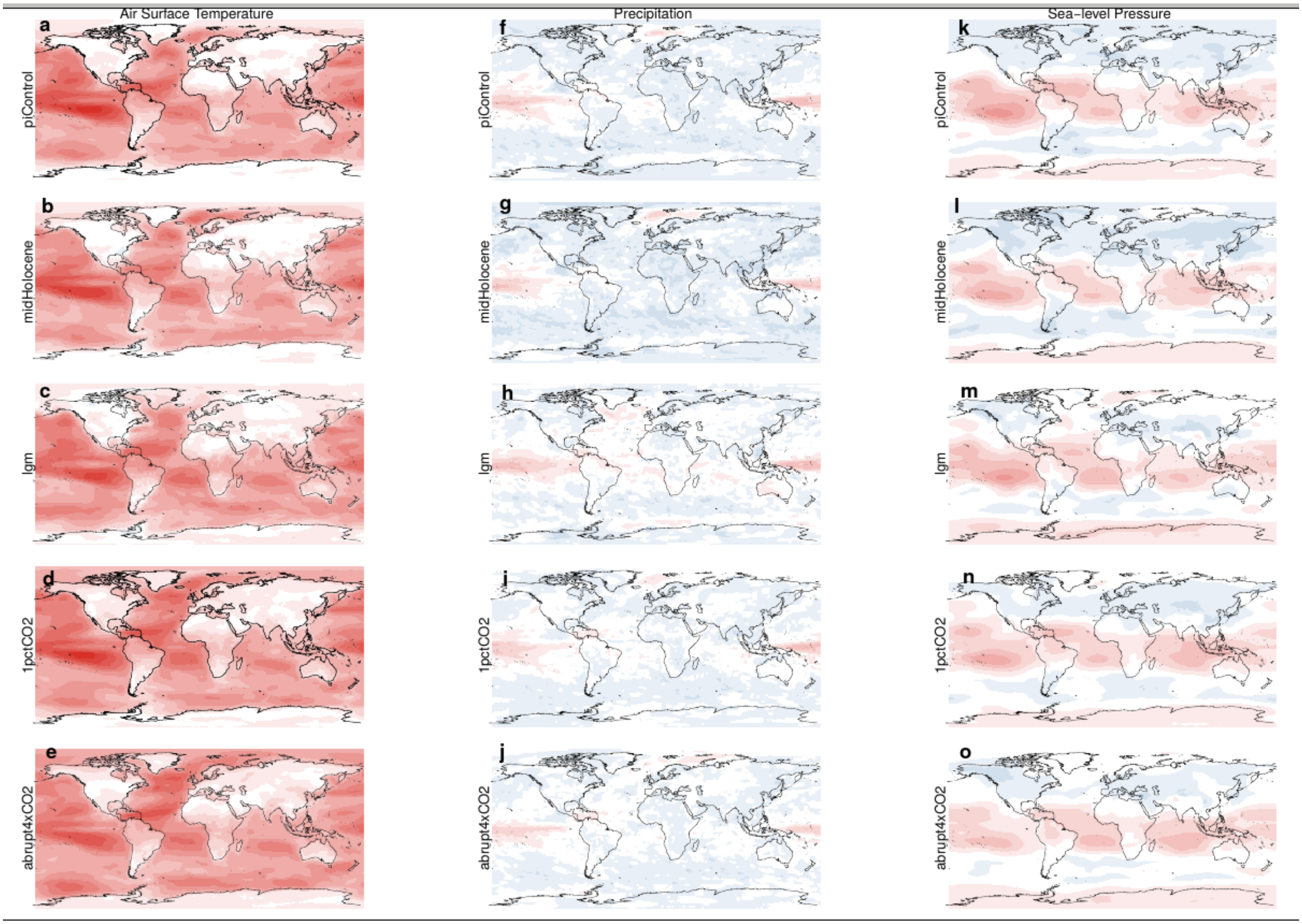

Figure S4. Shown are the scaling exponents β for the selected experiments (rows) and for three variables of interest (columns), fitted between timescales of 4 months and 20 years. White regions indicate zero scaling (i.e., “white” spectra), reddish colors indicate positive scaling (“red” spectra showing increasing variance with timescale) and blue-ish colors indicating negative scaling (“blue” spectra indicating decreasing variance with timescale).

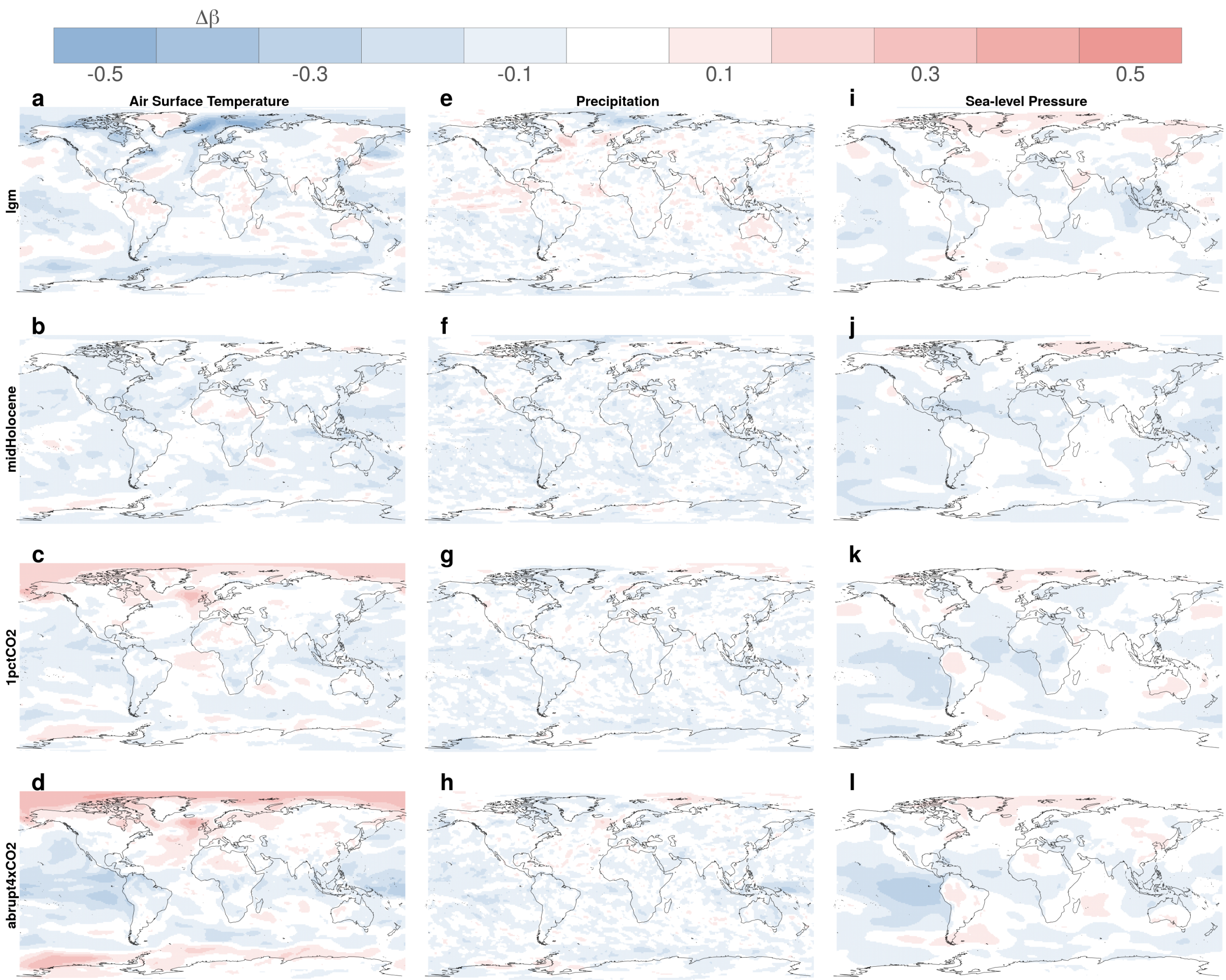

Figure S5. Change in the scaling of the spectral exponent β, as shown on Fig. SF4, in the experiments with respect to the *piControl* experiment.

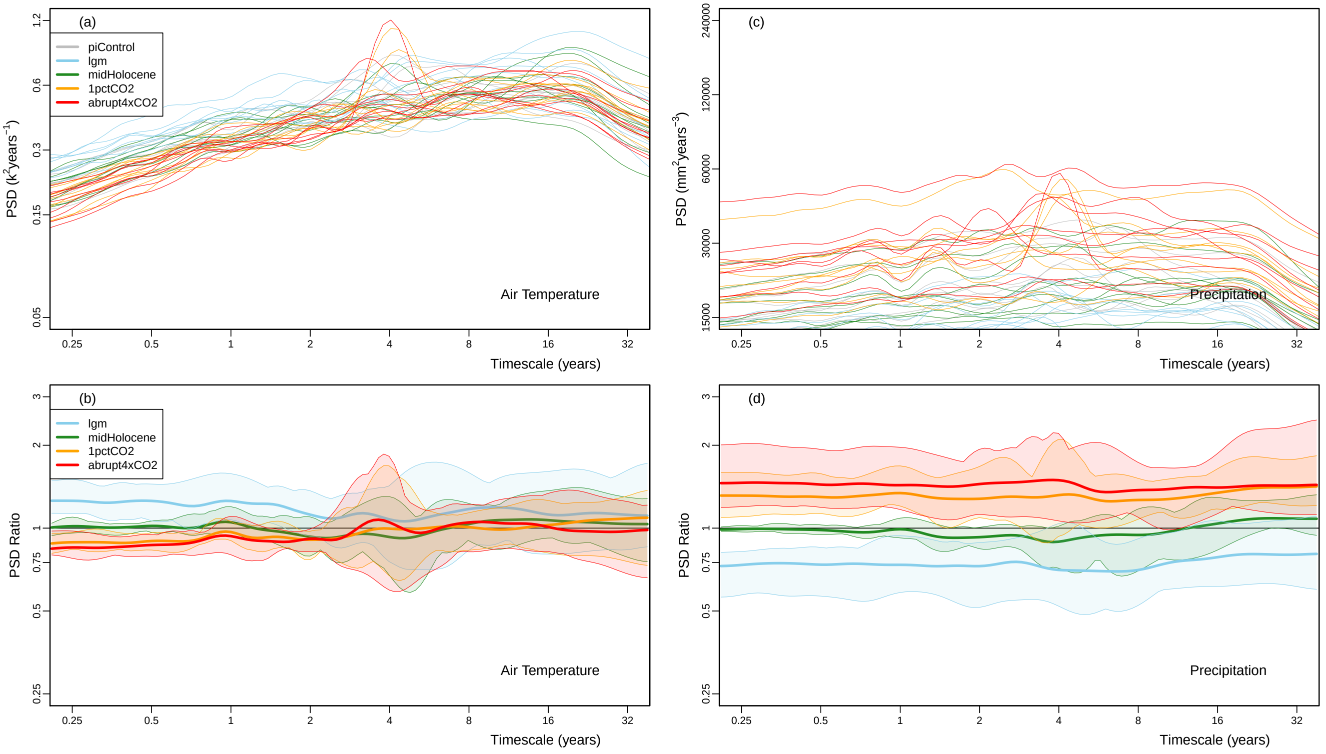

Figure S6. Following Fig. 6, here we show the global land surface area-weighted mean of air surface temperature (a) and precipitation (c) power spectra, and the multi-model mean of the spectral ratio EXP/PI, where the experiments (EXP) stands for lgm, mid Holocene, 1pctCO2 and abrupt4xCO2 (b,c).

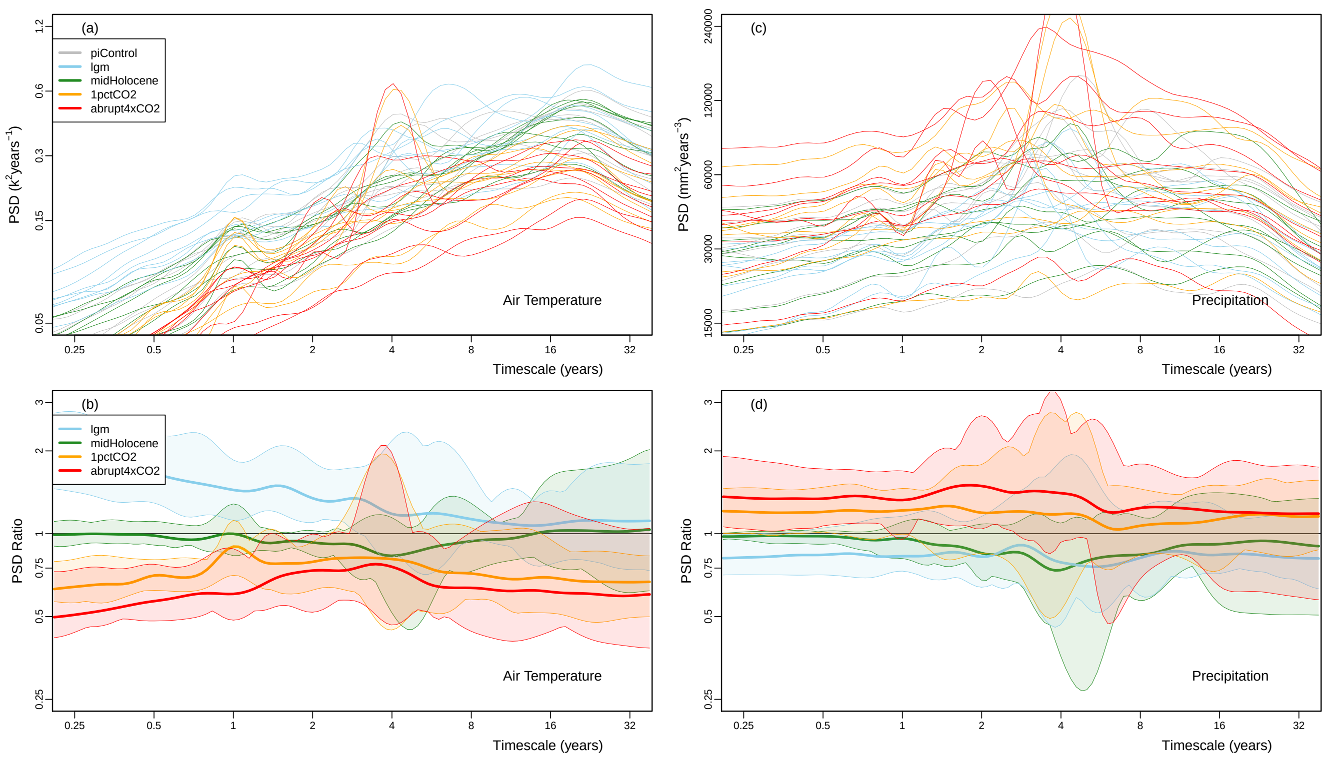

Figure S7. As SF6, but for temperature and precipitation over global oceans.

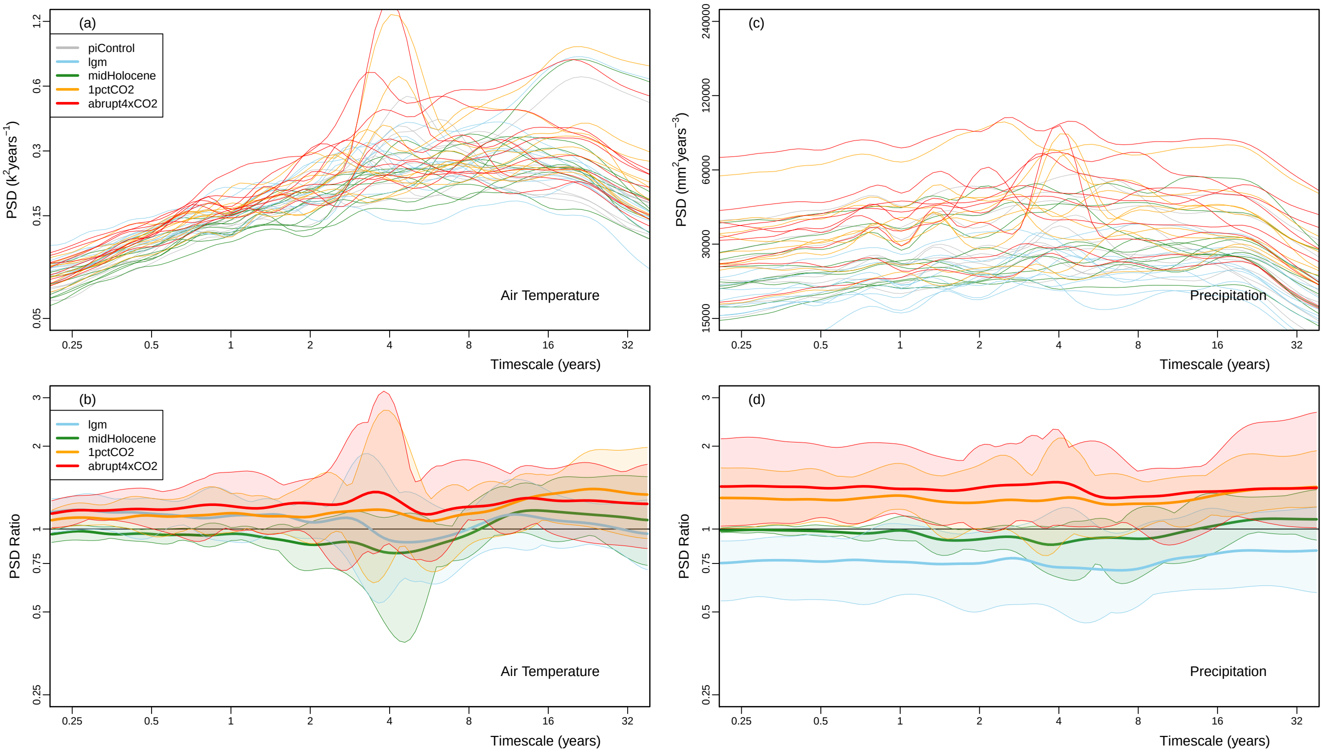

Figure S8. As SF6/SF7 and Fig. 6 in the manuscript, but restricted to the surface air temperature over continents and equatorward of 40°N/S.