The impact of a future solar minimum on Northern Hemispheric climate change projections

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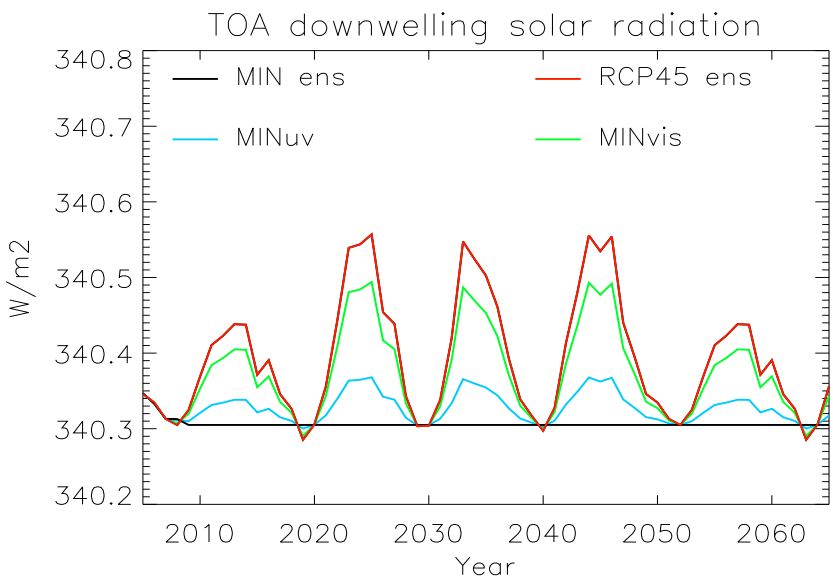
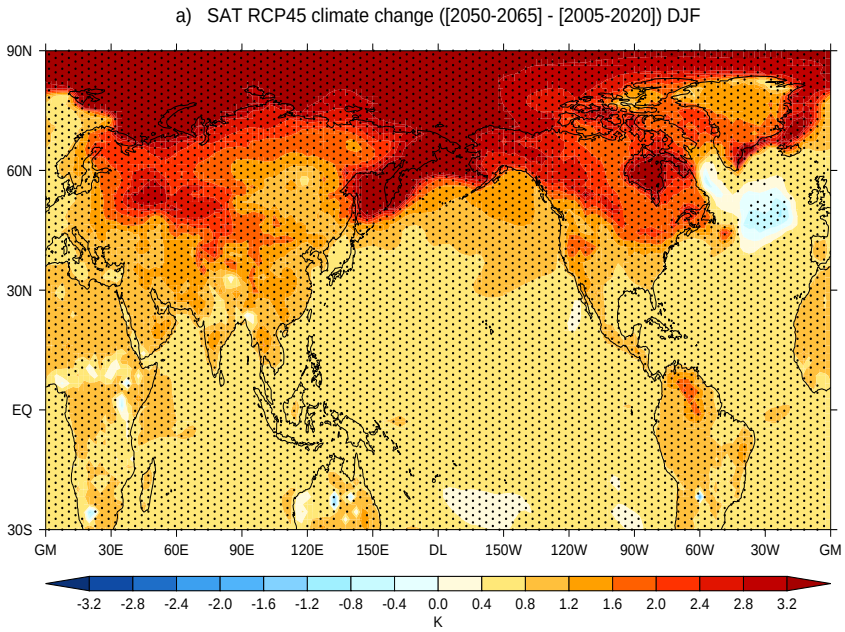
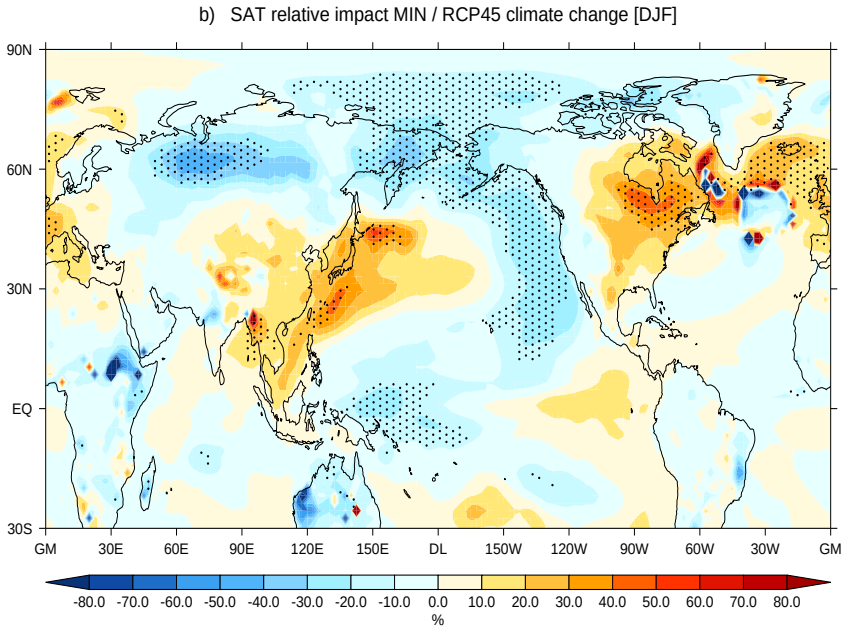
Supplementary material

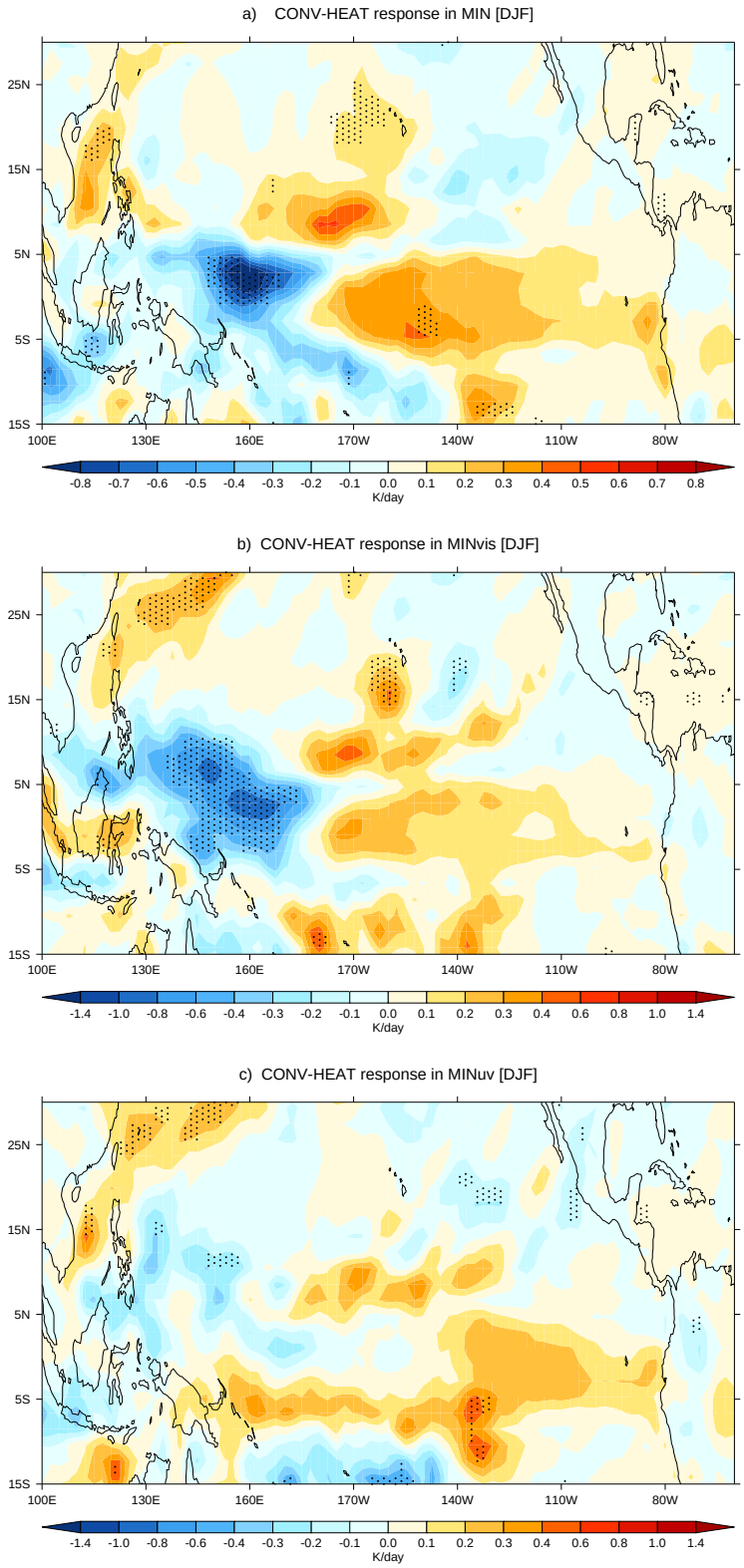


Supplementary Figure 1: Time series of the annual mean global average downwelling solar radiation at the Top of the Atmosphere (TOA) in the MINuv (blue), MINvis (green), MIN (black) and RCP45 (red) ensembles. Units W/m^2.

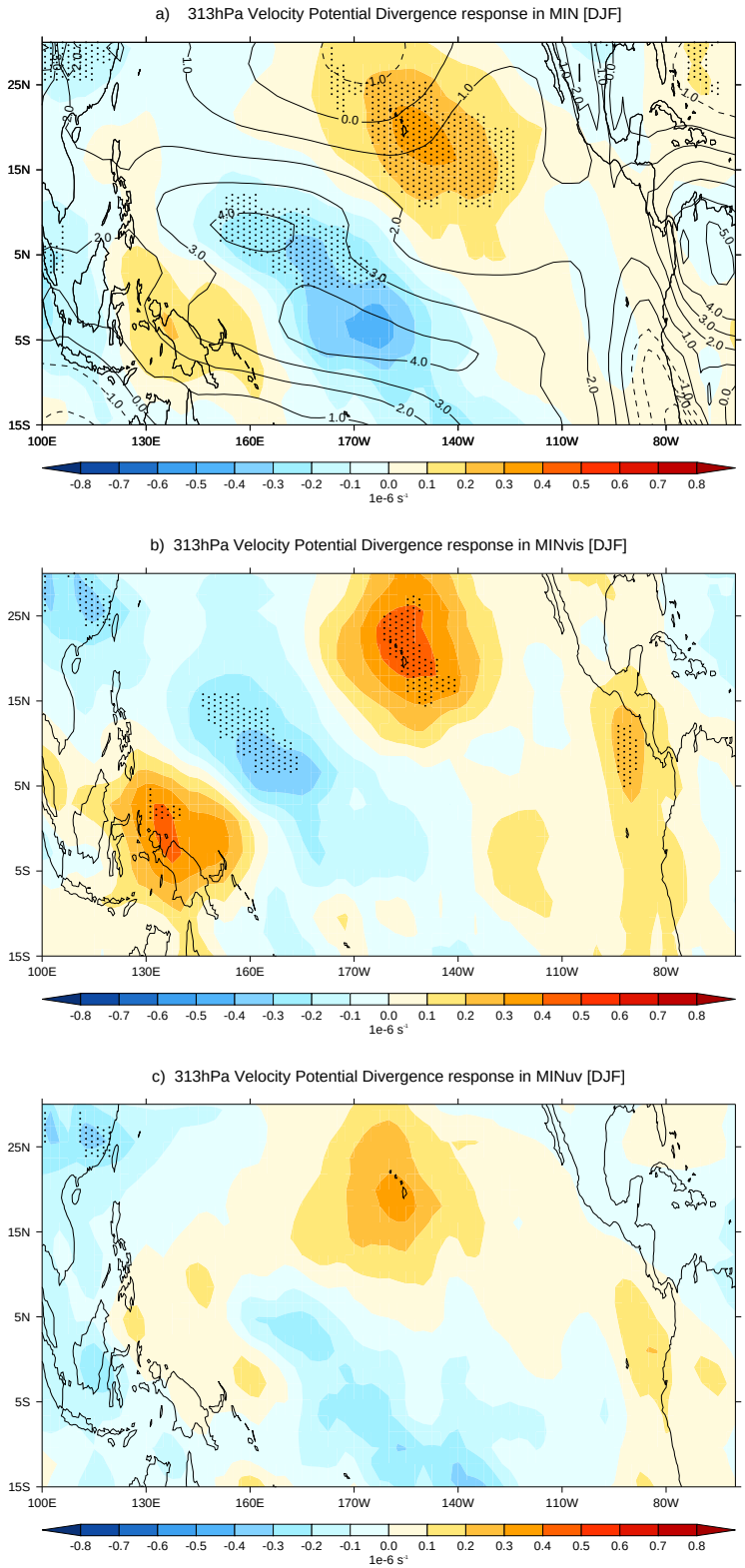




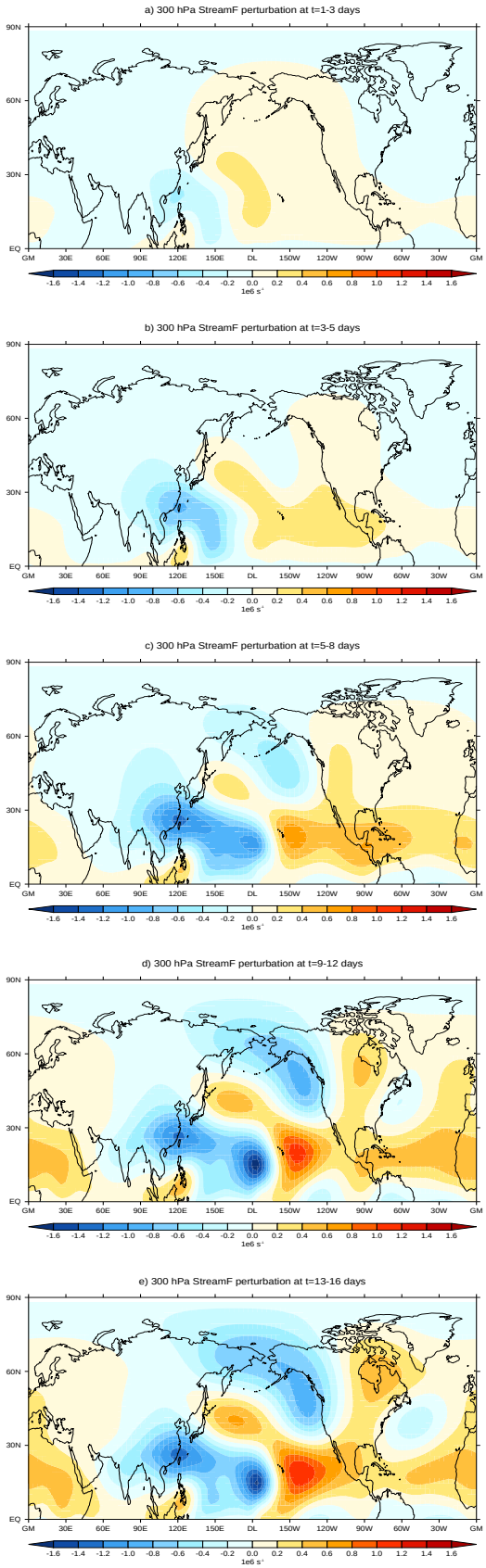
Supplementary Figure 2: a) Boreal winter ensemble mean climate change response in SAT in the RCP45 simulations, calculated as a difference of [2050-2065] minus [2005-2020] climatologies, units K.; (b) relative impact (in %) of the MIN forcing on boreal winter climate change, calculated as the fraction of the SAT response in MIN (Fig. 2a) to the RCP45 climate change response shown in (a). Stippled areas indicate significant differences at 95% confidence level. Areas without a positive climate change response are masked out in (b).



Supplementary Figure 3: As in Fig. 2, for vertically integrated convective heating response. Contours are drawn every 0.1 K/day. Units K/day



Supplementary Figure 4: As in Fig. 2, for upper tropospheric velocity potential divergence response. Contours are drawn every 10^{-6} s^{-1}. Negative (positive) values denote convergence (divergence). Black contour lines denote the climatological values in the RCP45 ensemble, with contour interval of 1 x 10^{-6} s^{-1}. Units s^{-1}



Supplementary Figure 5: Time evolution of the streamfunction response to an spatially uniform diabatic heating perturbation localized in the Warm Pool region of -0.5 K/day, as simulated from an idealized stationary wave model. The sequence shows the averages for (a) 1-3, (b) 3-5, (c) 5-8, (d) 8-12 and (e) 13-16 days from the initial perturbation. Contours are drawn every 0.2 x 10^6 s^{-1}. Units s^{-1}