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Supplemental Material

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Supplementary Material:

**No surface cooling over Antarctica from the negative greenhouse effect
associated with instantaneous quadrupling of CO₂ concentrations**

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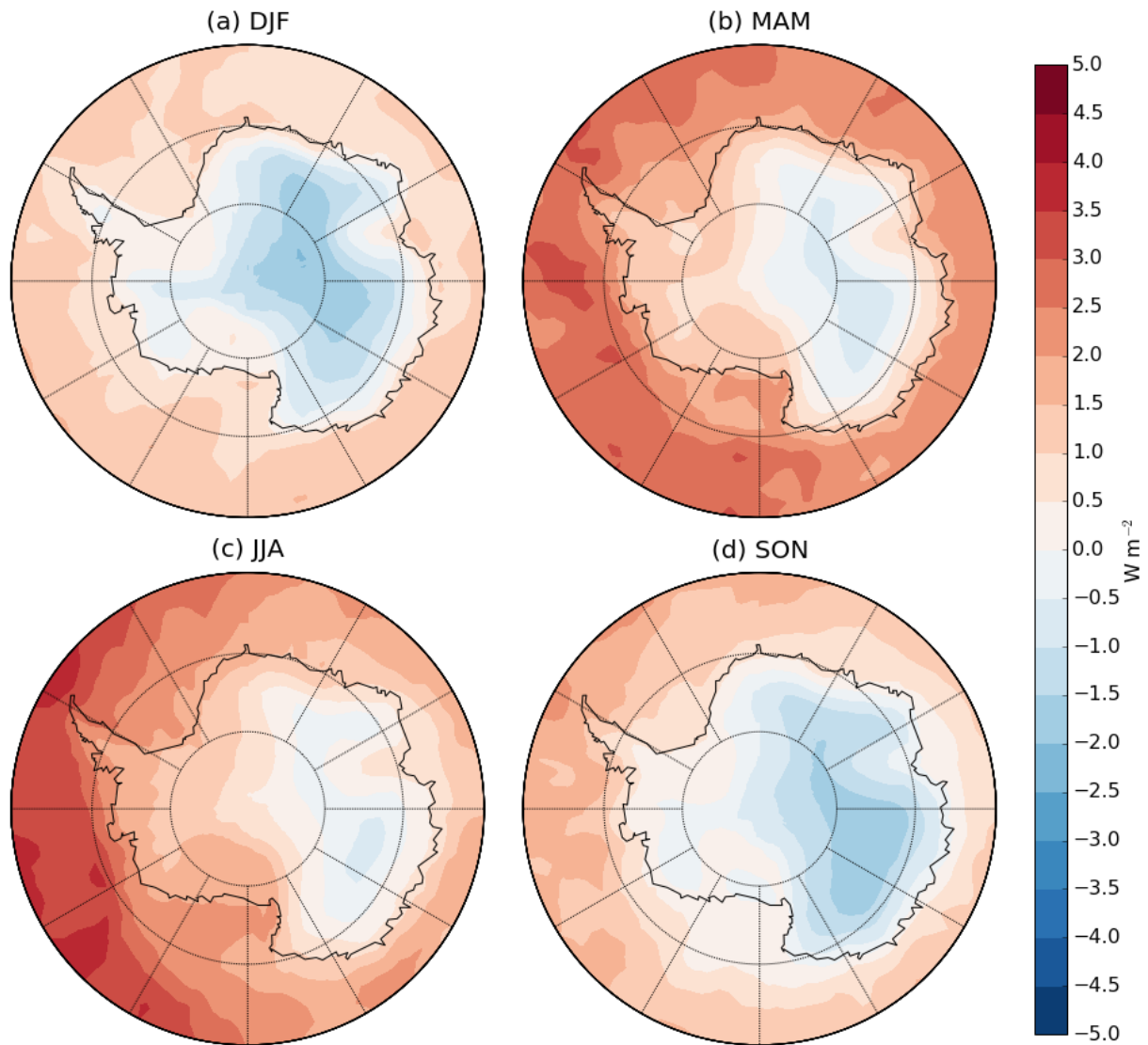
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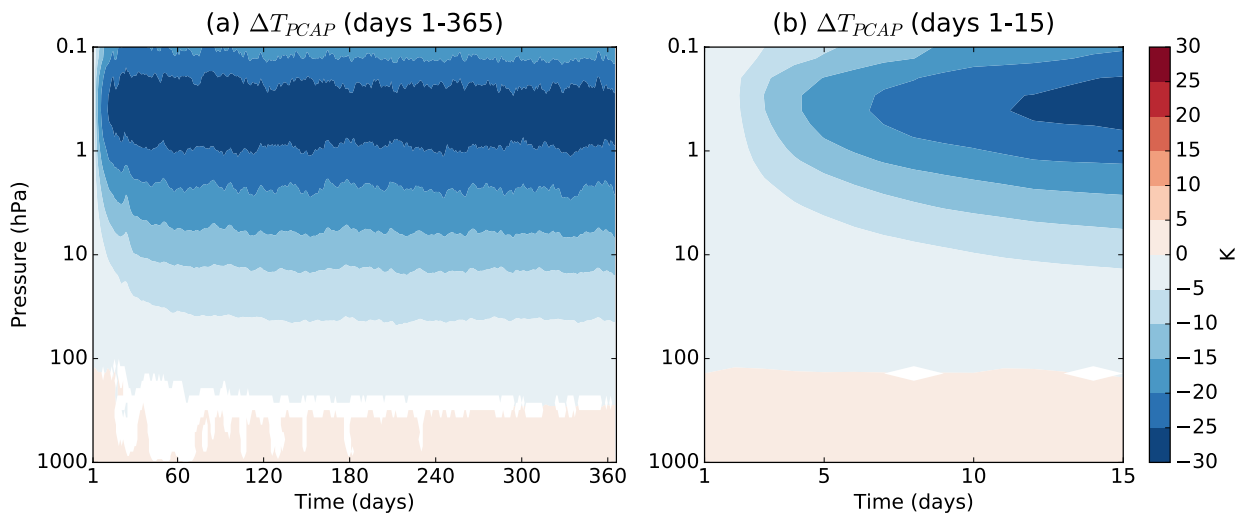
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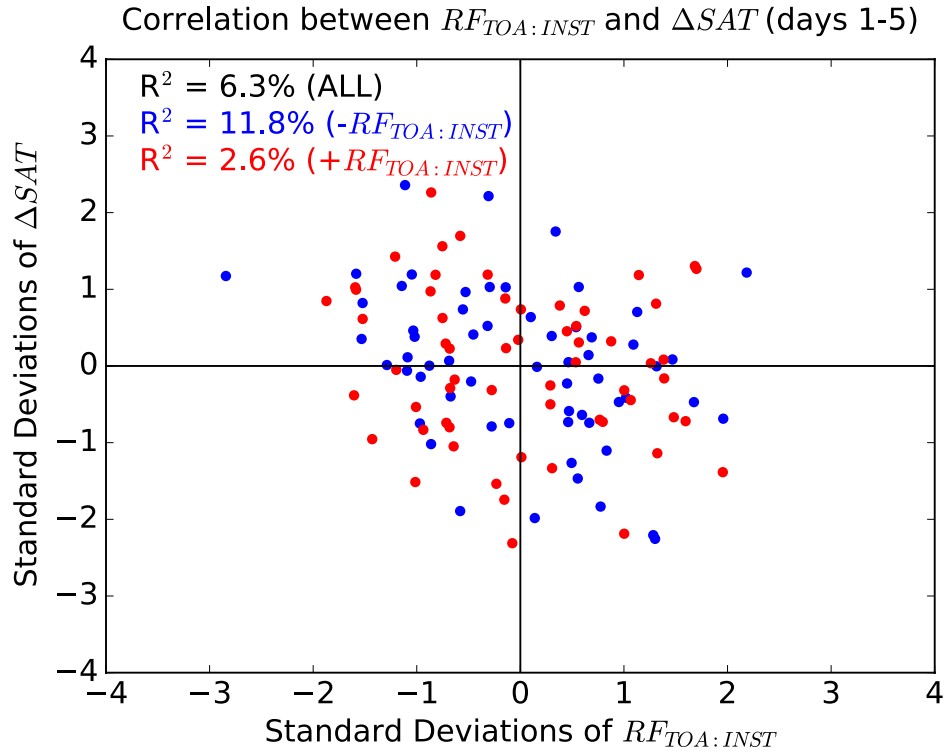
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1 FIG. S1. $RF_{TOA:INST}$ for the PORT integrations for (a) DJF: December-January-February, (b) MAM: March-
 2 April-May, (c) JJA: June-July-August and (d) SON: September-October-November. Downward fluxes are posi-
 3 tive.



4 FIG. S2. Time series of the SC-WACCM ensemble and 12-month mean polar cap-averaged (70-90°S) tem-
 5 perature response (ΔT_{PCAP}) as a function of day and pressure level for (a) the full year of the integrations and (b)
 6 the first 15 days of the integrations. White shading indicates regions that are not statistically significant at the
 7 95% level.



8 FIG. S3. Scatter plot of East Antarctic area-averaged and standardized $RF_{TOA:INST}$ magnitude versus ΔSAT
 9 in the SC-WACCM integrations. All ensemble members and all months are included. Each ensemble member
 10 is standardized by removing the ensemble mean and dividing by the ensemble standard deviation for the given
 11 month, such that all months can be plotted on the same axes. Blue markers indicate data points where the area-
 12 averaged $RF_{TOA:INST}$ is negative and red markers where it is positive. R-squared values (shown as % of variance
 13 explained) are shown for all data points (ALL), just the blue data points ($-RF_{TOA:INST}$) and just the red data
 14 points ($+RF_{TOA:INST}$). The ALL and $-RF_{TOA:INST}$ correlations are statistically significant at the 95% level.

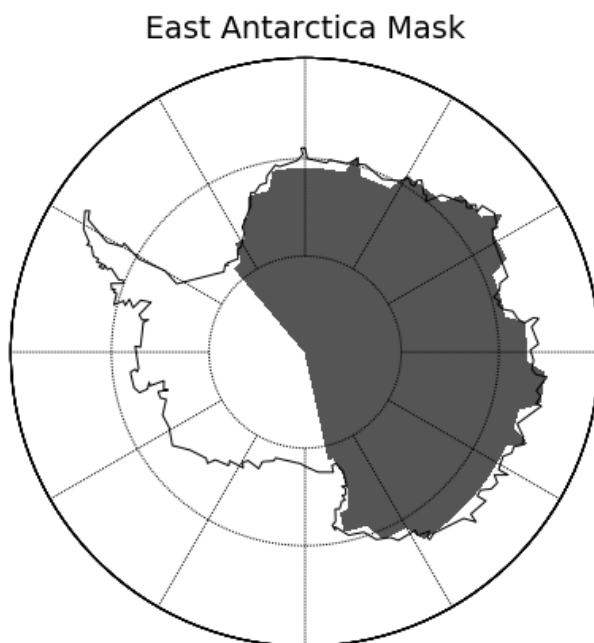
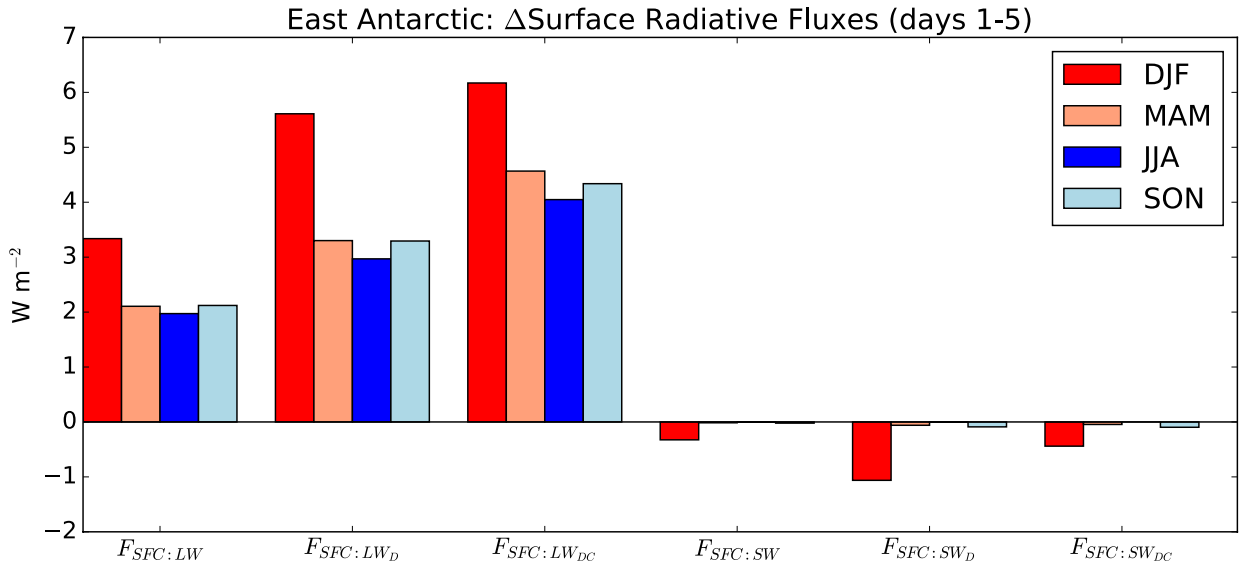


FIG. S4. Spatial mask used to define East Antarctica.



15 FIG. S5. East Antarctic area-averaged ensemble mean difference (SC-WACCM 4xCO₂ minus preindustrial)
 16 in surface energy fluxes (net surface long-wave flux: $F_{SFC:LW}$, downward long-wave flux: $F_{SFC:LW_D}$, downward
 17 clear-sky long-wave flux: $F_{SFC:LW_{DC}}$, net surface short-wave flux, $F_{SFC:SW}$, downward short-wave flux: $F_{SFC:SW_D}$,
 18 downward clear-sky short-wave flux: $F_{SFC:SW_{DC}}$) averaged over days 1-5 for each season (DJF: December-
 19 January-February, MAM: March-April-May, JJA: June-July-August, SON: September-October-November).
 20 Downward fluxes are positive.