Supplemental Material

Supplementary Material:

No surface cooling over Antarctica from the negative greenhouse effect associated with instantaneous quadrupling of CO_2 concentrations

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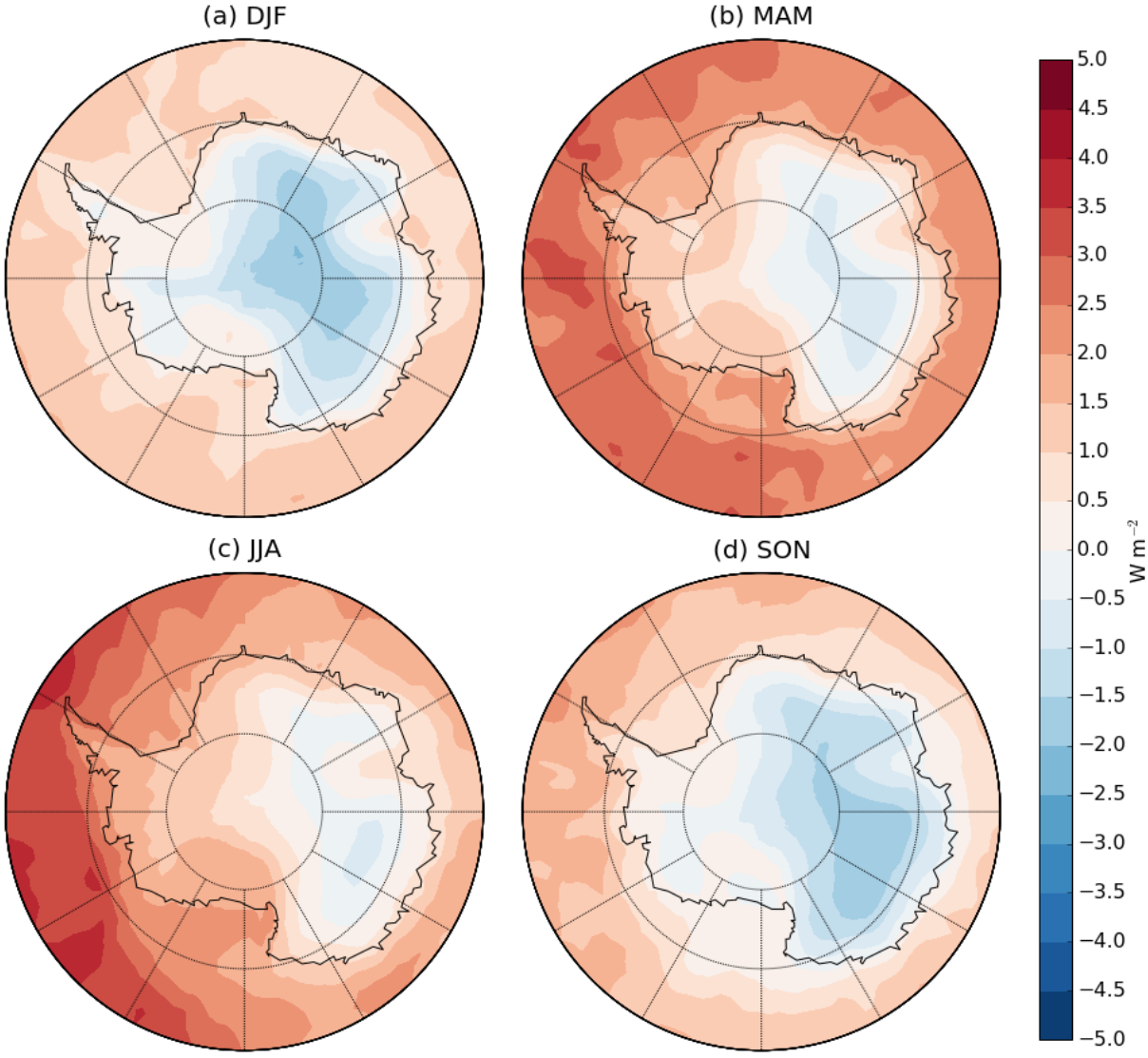

FIG. S1. $RF_{TOA:INST}$ for the PORT integrations for (a) DJF: December-January-February, (b) MAM: March-April-May, (c) JJA: June-July-August and (d) SON: September-October-November. Downward fluxes are positive.

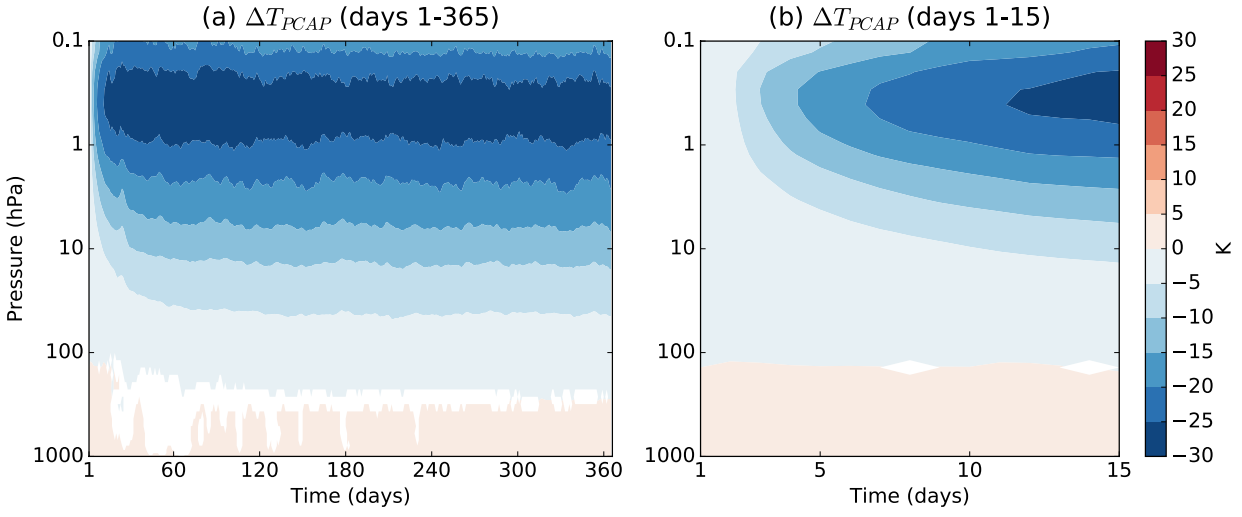

FIG. S2. Time series of the SC-WACCM ensemble and 12-month mean polar cap-averaged (70-90°S) temperature response (ΔT_{PCAP}) as a function of day and pressure level for (a) the full year of the integrations and (b) the first 15 days of the integrations. White shading indicates regions that are not statistically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

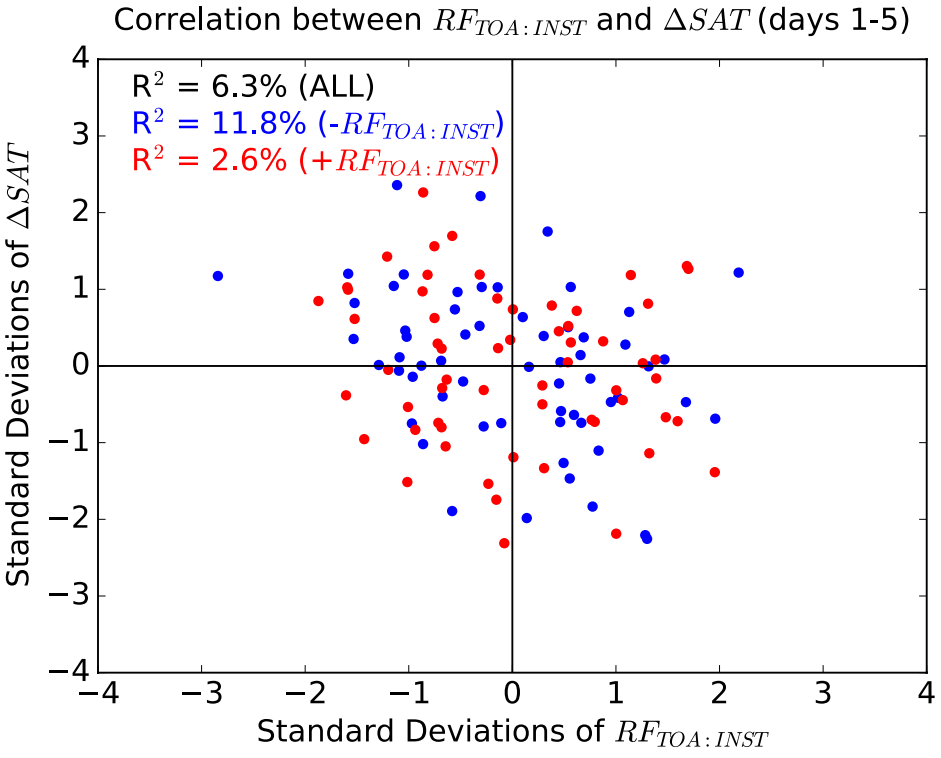

FIG. S3. Scatter plot of East Antarctic area-averaged and standardized $RF_{TOA:INST}$ magnitude versus ΔSAT in the SC-WACCM integrations. All ensemble members and all months are included. Each ensemble member is standardized by removing the ensemble mean and dividing by the ensemble standard deviation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

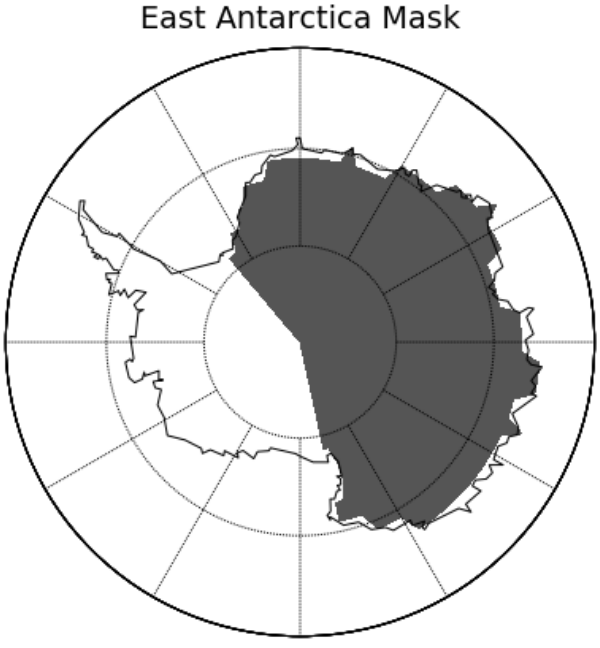

FIG. S4. Spatial mask used to define East Antarctica.

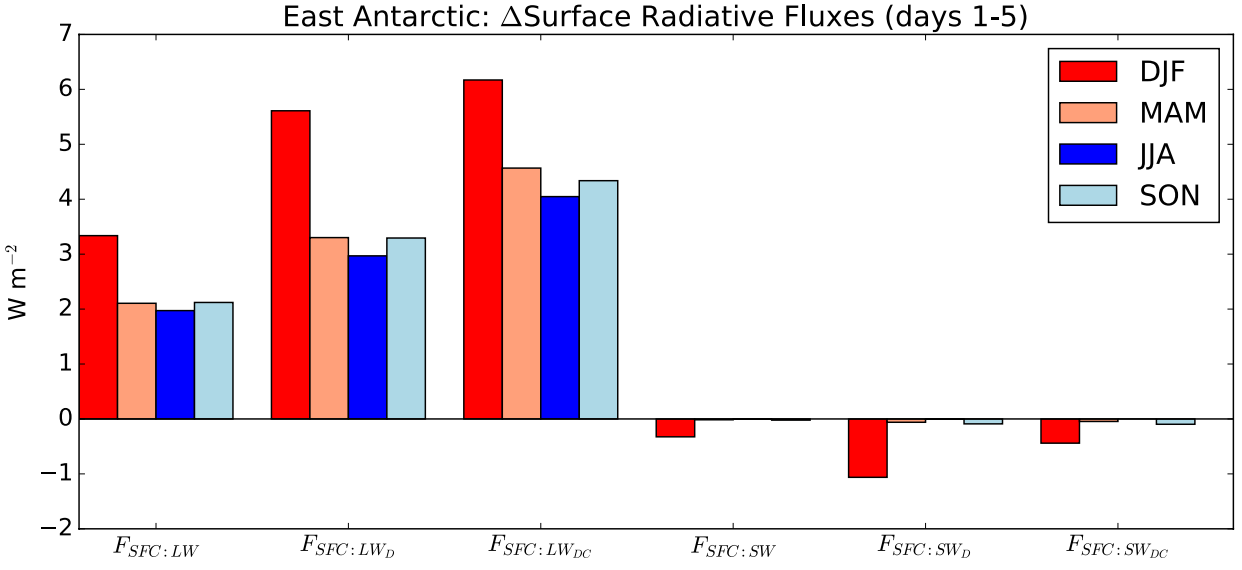

FIG. S5. East Antarctic area-averaged ensemble mean difference (SC-WACCM 4xCO_2 minus preindustrial) in surface energy fluxes (net surface long-wave flux: $F_{SFC:LW}$, downward long-wave flux: $F_{SFC:LW_D}$, downward clear-sky long-wave flux: $F_{SFC:LW_{DC}}$, net surface short-wave flux, $F_{SFC:SW}$, downward short-wave flux:$F_{SFC:SW_D}$, downward clear-sky short-wave flux: $F_{SFC:SW_{DC}}$) averaged over days 1-5 for each season (DJF: December-January-February, MAM: March-April-May, JJA: June-July-August, SON: September-October-November). Downward fluxes are positive.