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Supplement of

Using optimization tools to explore stratospheric aerosol injection strategies

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Supplemental Material for: Using Optimization Tools to Explore Stratospheric Aerosol Injection Strategies

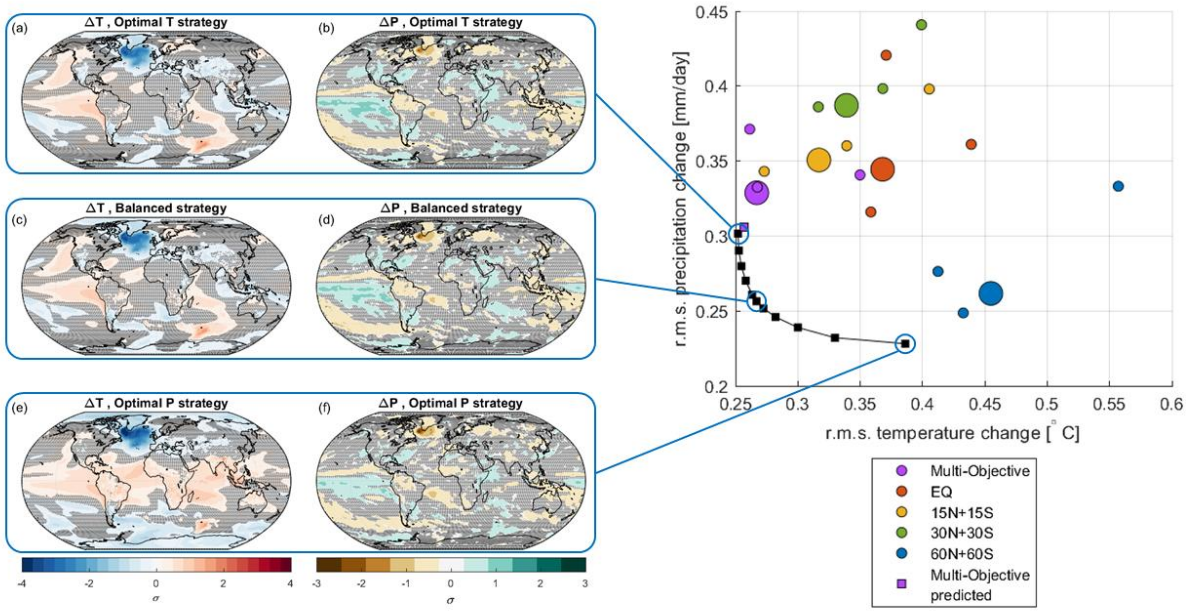

Figure S1: Same as figure 6, but with the optimization metrics normalized by the reference-period standard deviation in each grid cell. Maps on the left show the difference in temperature and precipitation from the reference period for 3 different optimal temperature vs precipitation strategies. The scatter plot on the right shows which points on the Pareto front these strategies refer to, as well as the r.m.s. temperature and precipitation changes in existing strategies. Large circles are ensemble averages, and small circles are individual ensemble members. Note that the maps on the left are shown in absolute units so that the patterns can be more directly compared to figure 4, but the scatter plot on the right is shown in units of standard deviations.

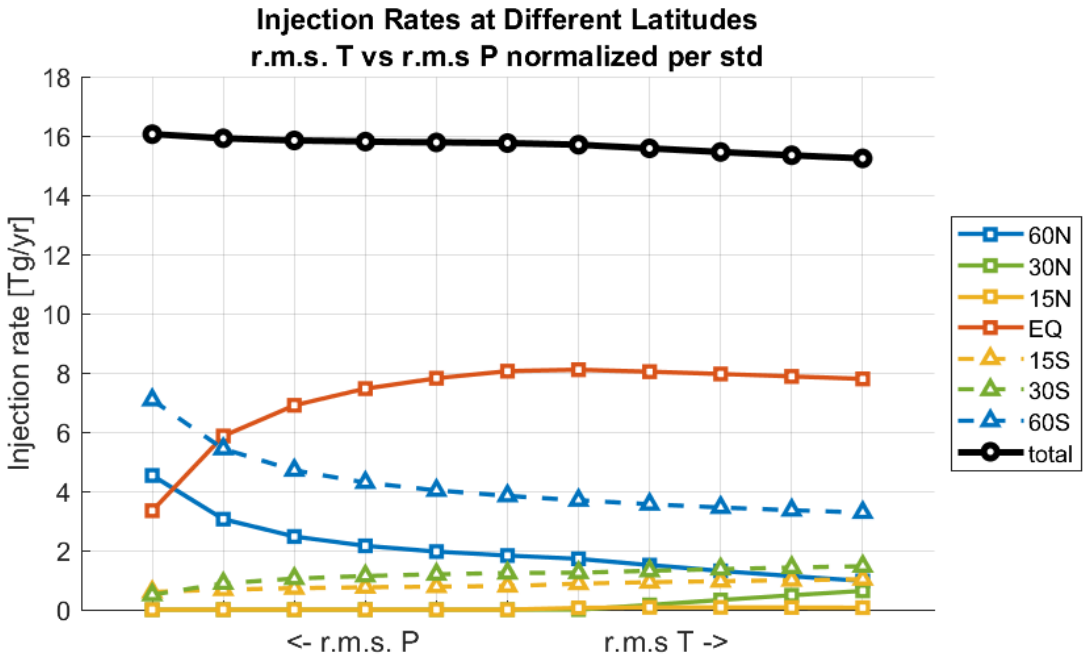

Figure S2: Injection rates throughout the pareto front for r.m.s. temperature vs r.m.s. precipitation, normalized per standard deviation

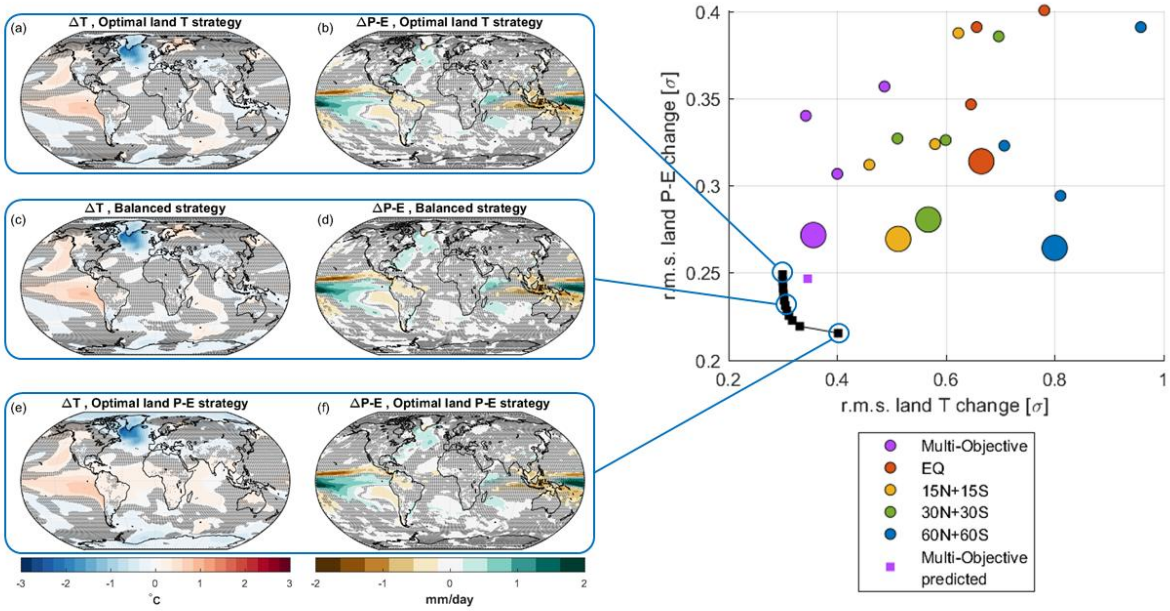

Figure S3: Same as figure S1, but for r.m.s. land temperature vs r.m.s. land precipitation minus evaporation

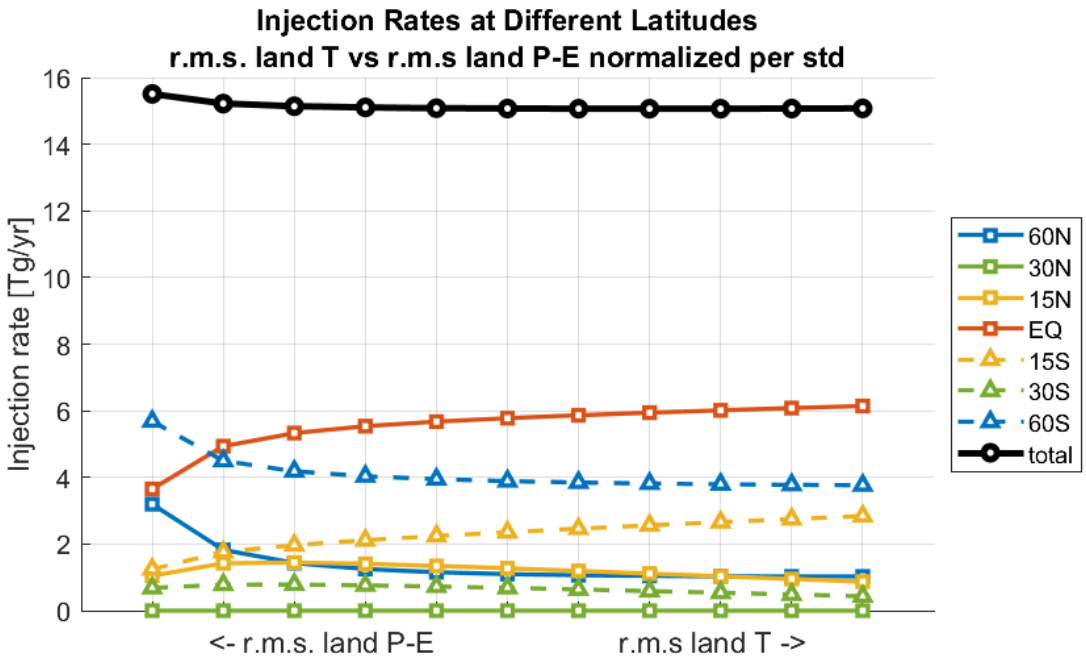

Figure S4: Injection rates throughout the pareto front for r.m.s. land temperature vs r.m.s. land precipitation minus evaporation, normalized per standard deviation

Figure S5 shows the scalar variables used in this study plotted against T_0 for SSP2-4.5. This shows that these variables scale approximately linearly with respect to T_0, and errors due to nonlinearities are smaller than the noise. Note that for SSI, the linear approximation is only valid for the first few decades, before it approaches zero. This is why 2030-2049 was chosen instead of 2050-2069 as the future time period for SSI.

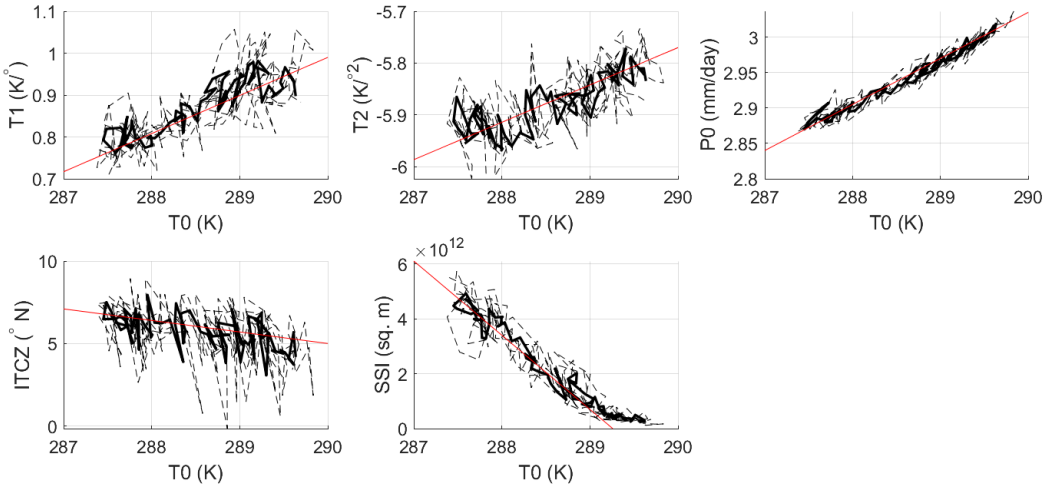

Figure S5: Select variables vs global-mean surface temperature (T_0) for the SSP2-4.5 simulations from 2000-2069. Solid black lines are ensemble means, dashed black lines are individual ensemble members, and red lines are a linear fit with the slope equal to the α values from Table 2.