Supplementary Materials for: Impact of solar geoengineering on temperature-attributable mortality

Contains Supplementary Figures S1-S19 and Tables S1-S6

A Methods Figures

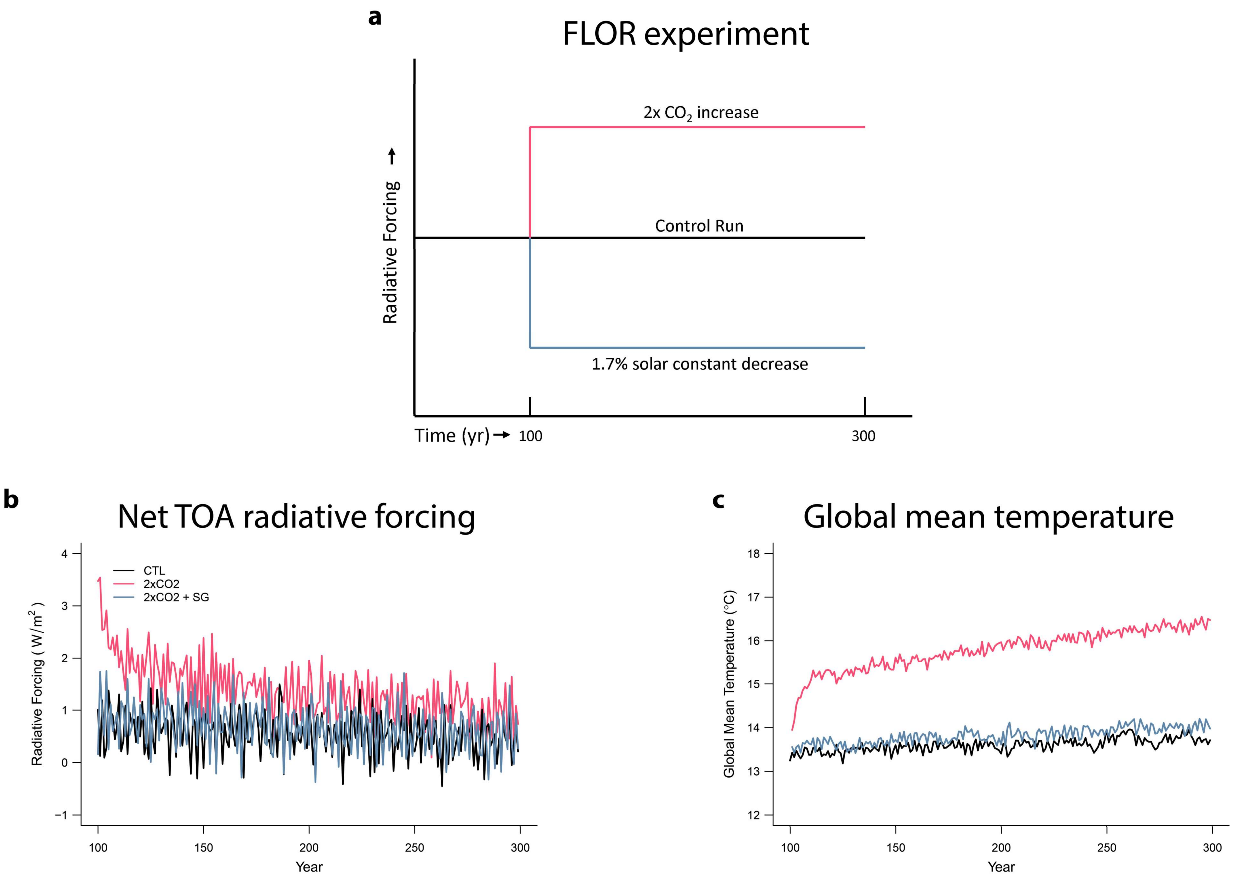


Figure S1 | FLOR Experiment. a simulation experiment setup. **b** net top-of-the-atmosphere radiative forcing and **c** global mean temperature for each climate simulation.

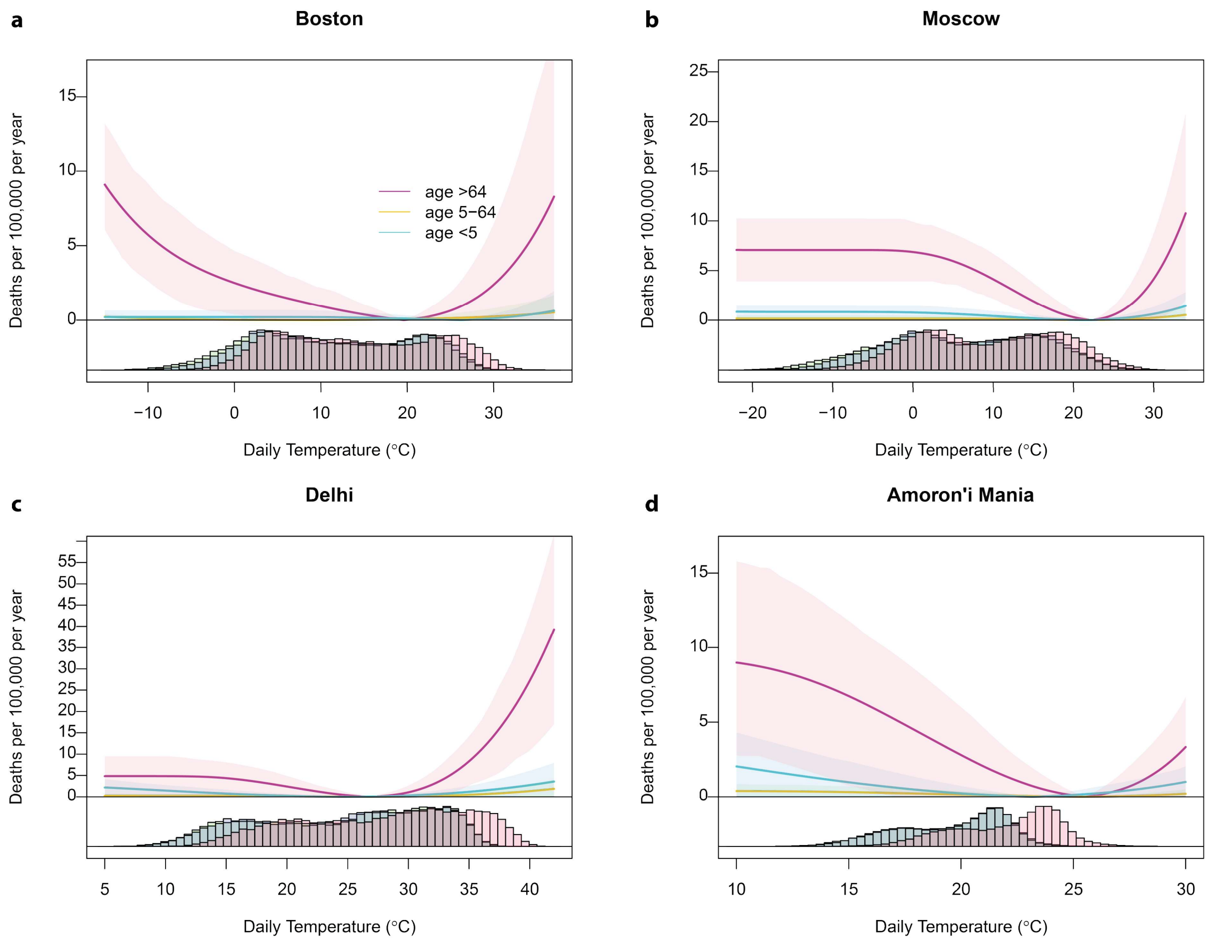


Figure S2 | Empirical dose-response function. Temperature-mortality dose-response function for each age group across four impact regions (labelled for the major city contained in the impact region). Dose-response curves are estimated using 2015 SSP3 income and assuming adaptation to 1990s climate with clipping as outlined in Carleton et al. (2022). Lines indicate median estimate. Shading indicates 90% confidence intervals. Below are each city's respective distribution of daily temperatures for 1990s climate in green, 2xCO_2 in red, and 2xCO_2+SG in blue.

B Additional Climate Response Figures

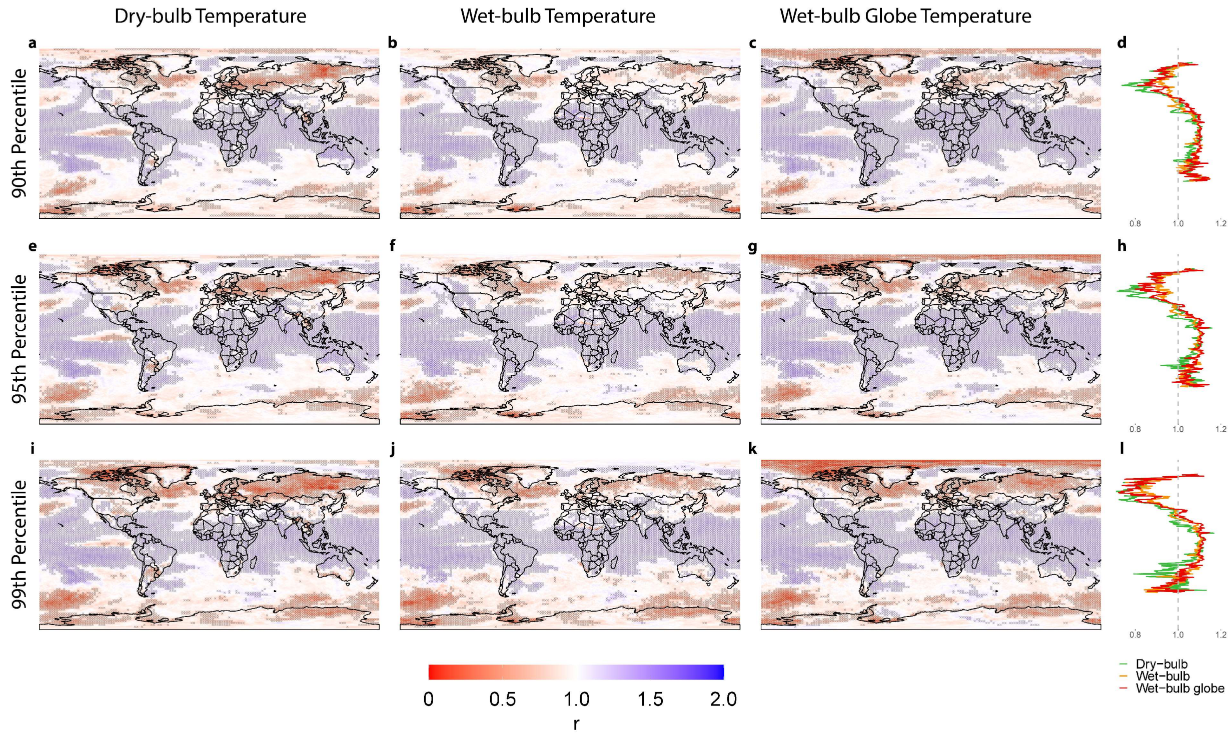


Figure S3 | Heatwave response to solar geoengineering relative to emissions cuts. The normalized difference in dry bulb, wet bulb, and wet bulb globe temperature between solar dimming and 2xCO2 experiments relative to the normalized difference between control and 2xCO2. Blue indicates solar geoengineering leads to colder temperatures and red indicates solar geoengineering leads to warmer temperatures. Values shown are median values across 100 simulation years. Crosshatches indicate statistical significance at 90% confidence level using a Wilcoxon signed rank test corrected following the false discovery rate. Zonal average response is calculated as the population-weighted average by latitude band.

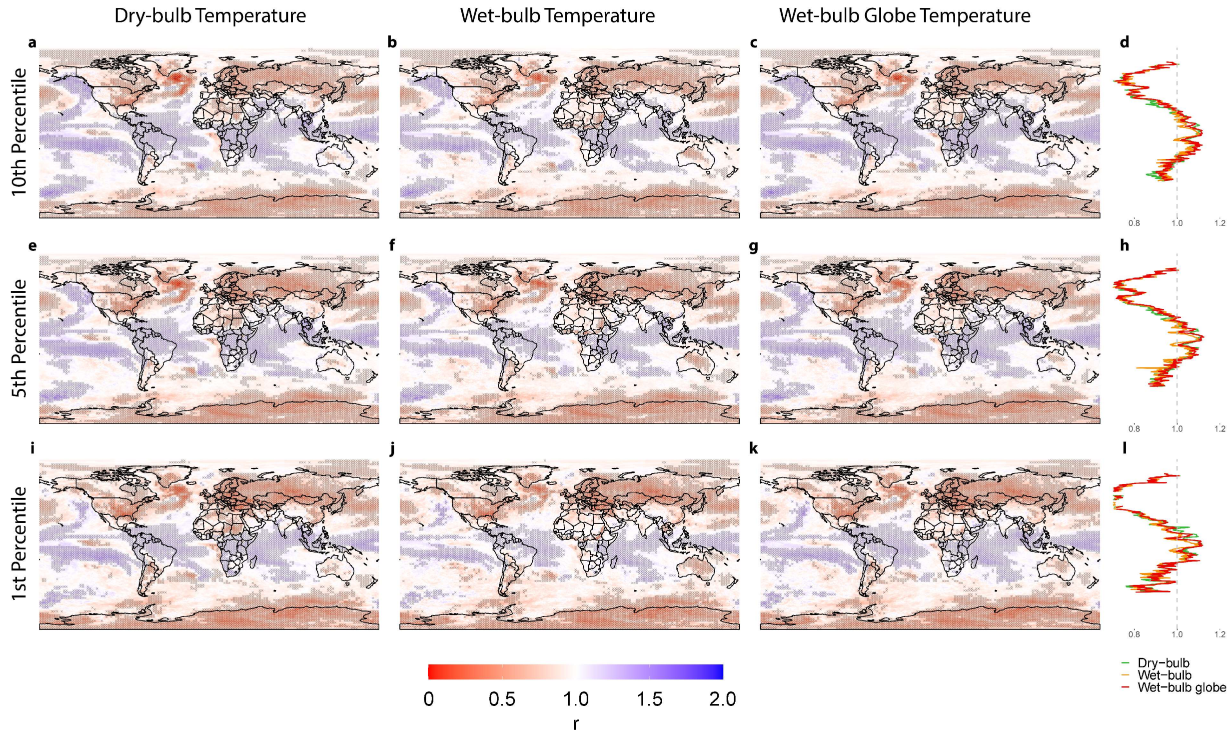


Figure S4 | Coldwave response to solar geoengineering relative to emissions cuts. The normalized difference in dry bulb, wet bulb, and wet bulb globe temperature between solar dimming and 2xCO2 experiments relative to the normalized difference between control and 2xCO2. Blue indicates solar geoengineering leads to colder temperatures and red indicates solar geoengineering leads to warmer temperatures. Values shown are median values across 100 simulation years. Crosshatches indicate statistical significance at 90% confidence level using a Wilcoxon signed rank test corrected following the false discovery rate. Zonal average response is calculated as the population-weighted average by latitude band.

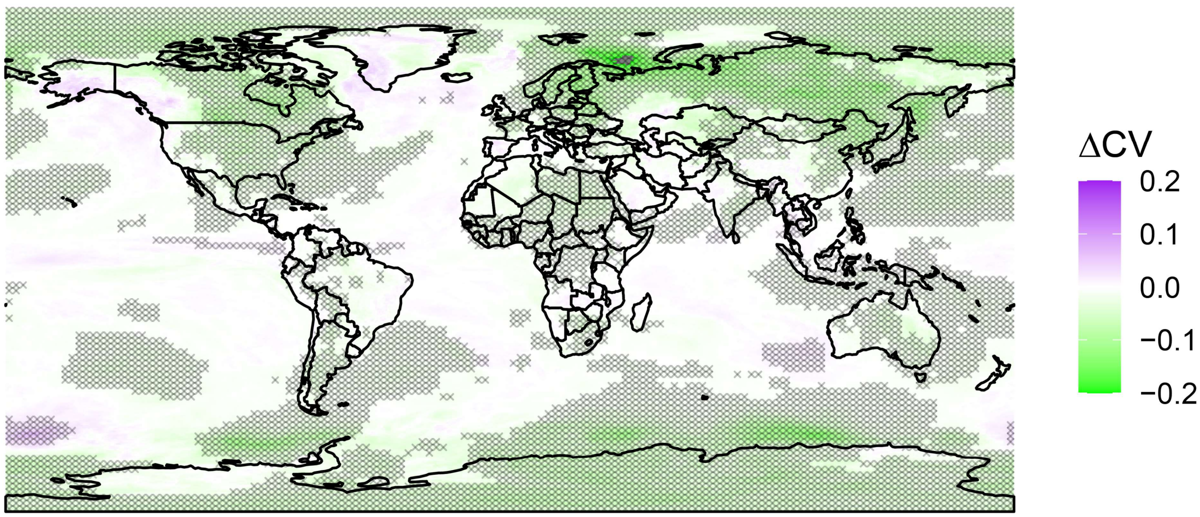


Figure S5 | Effect on Intra-annual Variability. The normalized effect of emissions reduction on intra-annual coefficient of variability differenced by the normalized effect of solar geoengineering. Procedure. Green areas indicate lower variability with solar geoengineering. Values shown are median values across 100 simulation years. Crosshatches indicate statistical significance at 90% confidence level using a Wilcoxon signed rank test corrected following the false discovery rate.

C Additional Results - SSP3

C.1 FLOR Climate Model

		Mean/Median Fraction of Global Population (%)			
		Impact of solar geo		Better off with solar geo or emissions reductions	
		Harmed	Benefit	ER	SG
No Adapt	Total	31/31	69/69	19/17	81/83
	Heat	0/0	100/100	2/3	98/97
	Cold	100/100	0/0	62/61	38/39
Inc. Growth	Total	33/35	67/65	22/18	78/82
	Heat	0/0	100/100	2/4	98/96
	Cold	99/100	1/0	60/61	40/39
Inc. Growth + Clim. Adapt	Total	35/40	65/60	23/20	77/80
	Heat	0/0	100/100	4/8	96/92
	Cold	95/90	5/10	59/54	41/46

Table S1 | Regional impact of solar geoengineering for FLOR climate model simulations. The left two columns show the percentage of the global population estimated to experience an increase in mortality rates with solar geoengineering (harmed) or a decrease in mortality rates (benefit). The right two columns show the percentage of the global population estimated to have lower mortality rates with emissions reduction (ER) or solar geoengineering (SG). Estimates are for the FLOR climate model simulations assuming cooling in 2080 under SSP3. Population weights of regions are for SSP3 population distribution in 2080. Results are shown for all temperature-, heat-, and cold-attributable mortality across no income growth or climate adaptation from 1990s (No Adapt), income growth to 2080 (Inc. Growth) and income growth to 2080 and adaptation to each respective climate model experiment (Inc. Growth + Clim. Adapt).

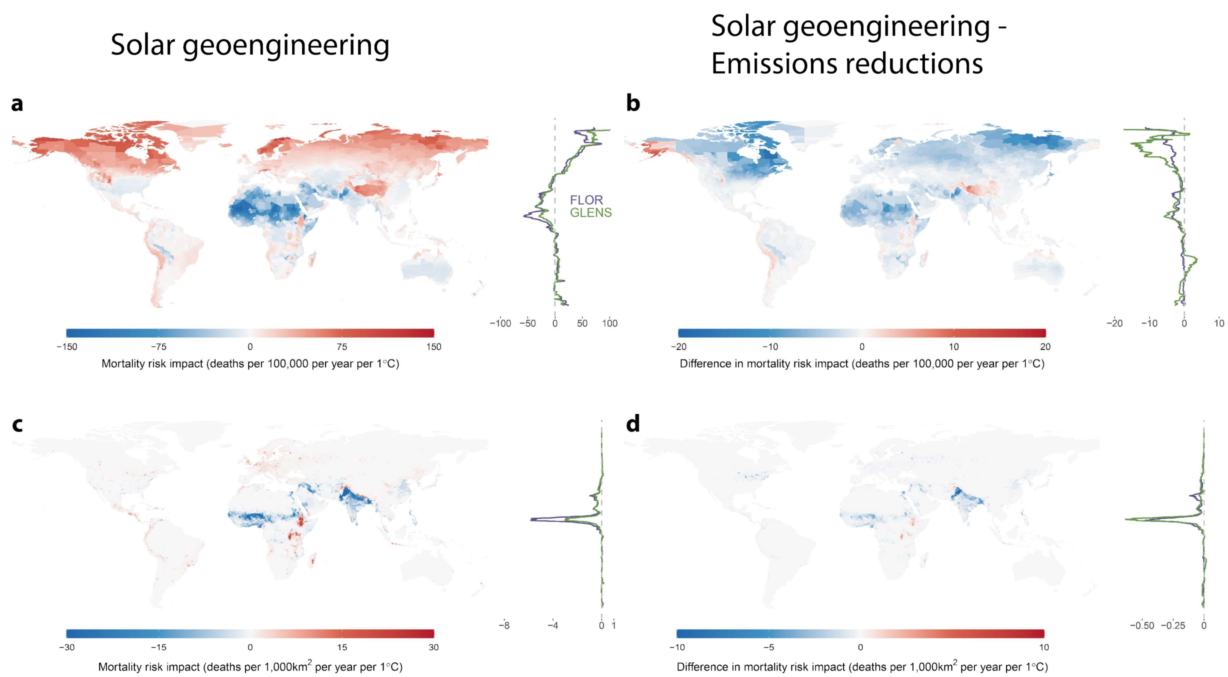


Figure S6 | Regional mortality rate impact – Income Growth. Panels **a** and **c** show the impact of SG on temperature-attributable mortality under the assumption of no climate adaptation or income growth. Red indicates regions SG increases mortality risk. Blue indicates regions SG reduces mortality risk. Panels **b** and **d** show the difference in mortality risk impact between SG and emissions reductions. Red indicates regions where mortality risk is higher in a world cooled with SG. Blue indicates regions where mortality risk is lower in a world cooled with SG. Panels **a** and **b** report impacts as deaths per 100,000 while Panels **c** and **d** report impacts as deaths per area, converting mortality rates to number of deaths using population in 2080. Maps present results for the FLOR climate model simulations. Zonal averages for both the FLOR and GLENS climate model simulations are shown to the right of each map. Estimates for the GLENS climate model are averaged over the 2050-2059 decade.

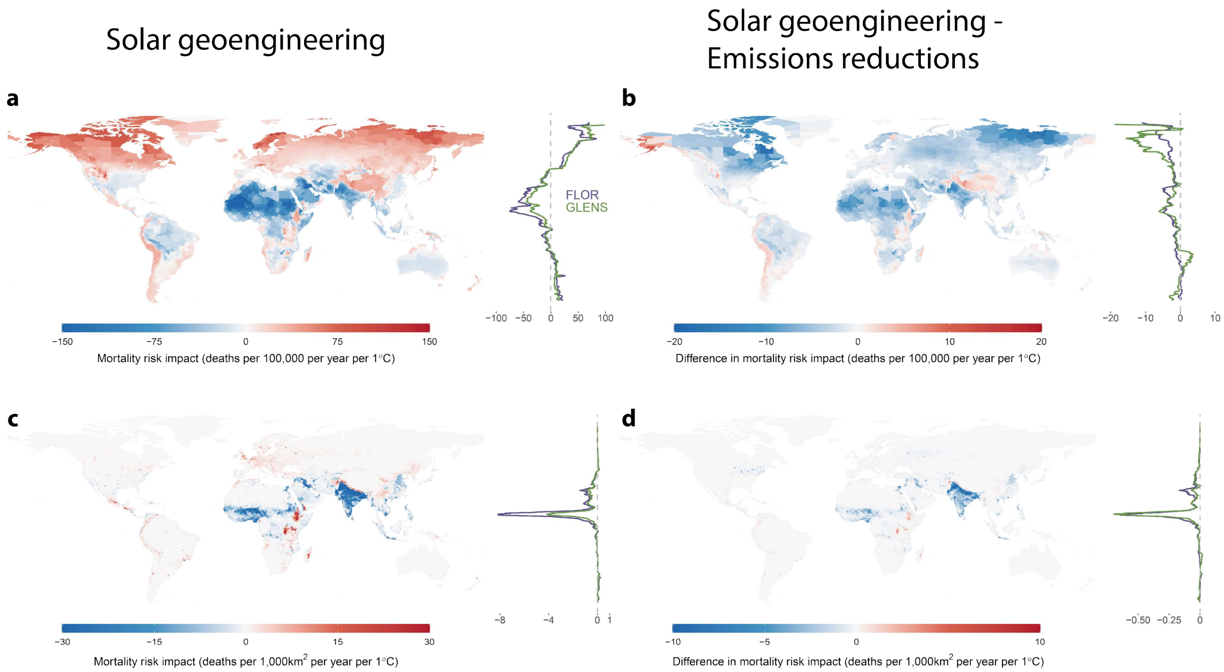


Figure S7 | Regional mortality rate impact – No Income Growth or Climate Adaptation. Panels **a** and **c** show the impact of SG on temperature-attributable mortality under the assumption of no climate adaptation or income growth. Red indicates regions SG increases mortality risk. Blue indicates regions SG reduces mortality risk. Panels **b** and **d** show the difference in mortality risk impact between SG and emissions reductions. Red indicates regions where mortality risk is higher in a world cooled with SG. Blue indicates regions where mortality risk is lower in a world cooled with SG. Panels **a** and **b** report impacts as deaths per 100,000 while Panels **c** and **d** report impacts as deaths per area, converting mortality rates to number of deaths using population in 2080. Maps present results for the FLOR climate model simulations. Zonal averages for both the FLOR and GLENS climate model simulations are shown to the right of each map. Estimates for the GLENS climate model are averaged over the 2050-2059 decade.

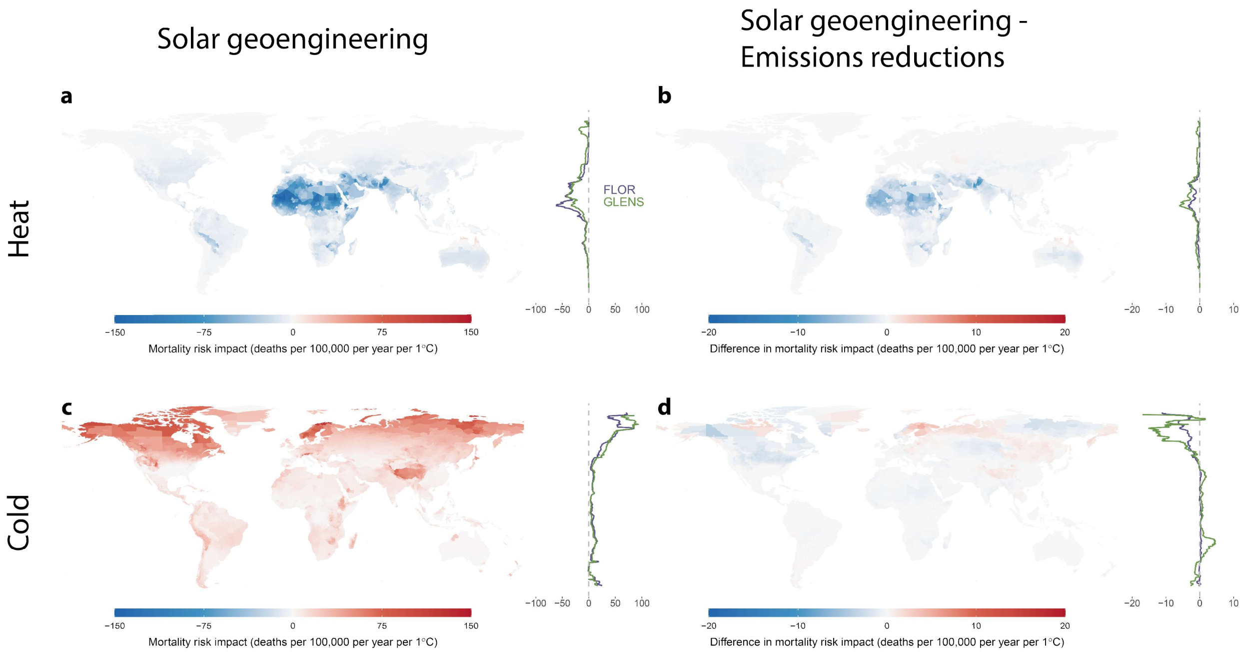


Figure S8 | Mortality Risk Impact by Heat/Cold – Income Growth. Impact of SG on **a** heat-attributable mortality and **c** cold-attributable mortality under the assumption of income growth and climate adaptation. Red indicates regions SG increases mortality risk. Blue indicates regions SG reduces mortality risk. Difference in **b** heat-attributable and **d** cold-attributable mortality impact between SG and emissions reductions. Red indicates regions where mortality risk is higher in a world cooled with SG. Blue indicates regions where mortality risk is lower in a world cooled with SG. Panels **a** and **b** report impacts as deaths per 100,000 while Panels **c** and **d** report impacts as deaths per area, converting mortality rates to number of deaths using population in 2080. Maps present results for the FLOR climate model simulations. Zonal averages for both the FLOR and GLENS climate model simulations are shown to the right of each map. Estimates for the GLENS climate model are averaged over the 2050-2059 decade.

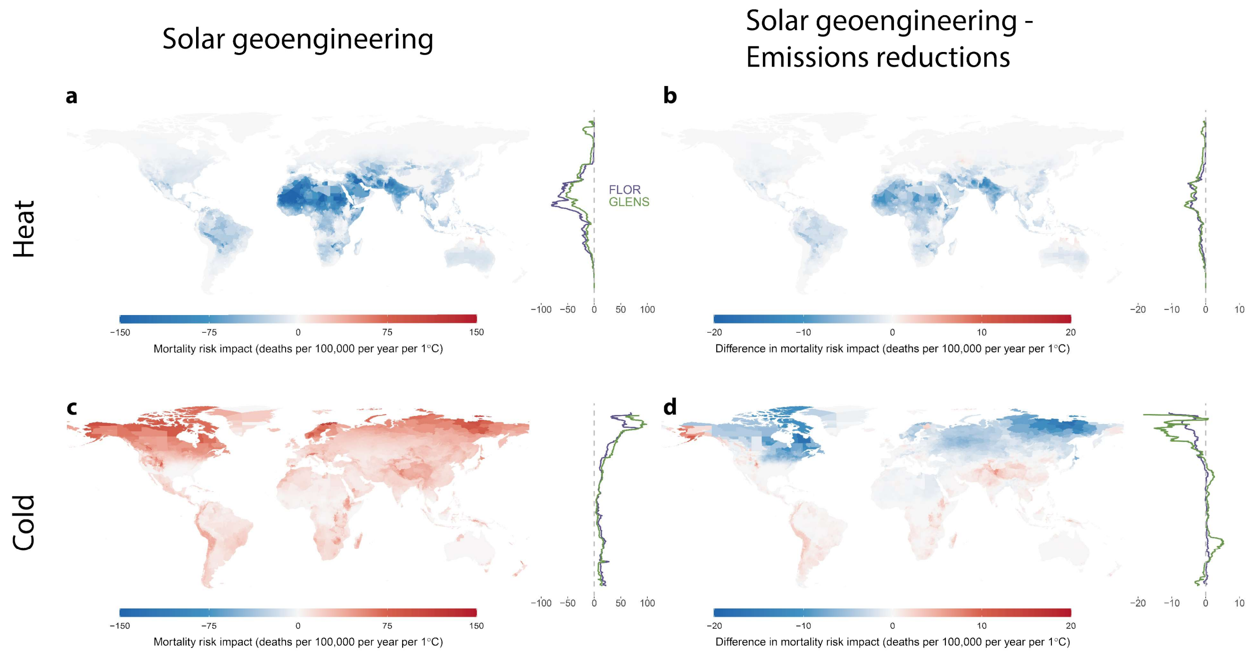
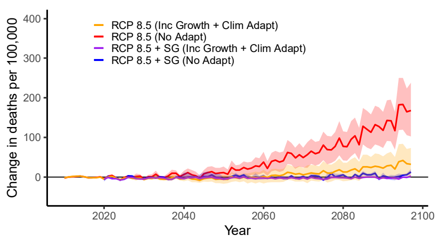
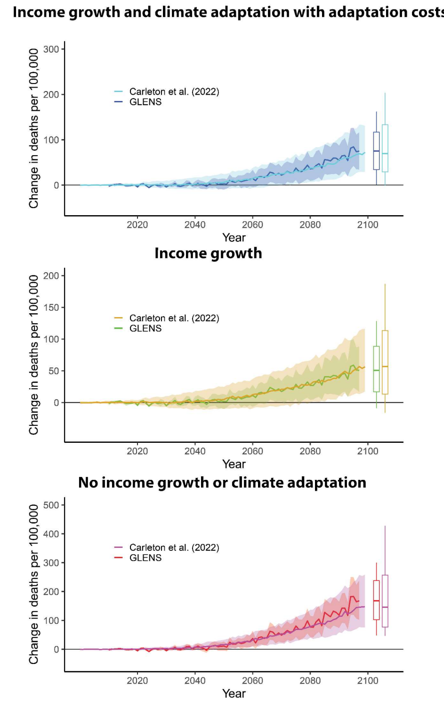


Figure S9 | Mortality rate impact by heat/cold – No Income Growth or Climate Adaptation. Impact of SG on **a** heat-attributable mortality and **c** cold-attributable mortality under the assumption of income growth and climate adaptation. Red indicates regions SG increases mortality risk. Blue indicates regions SG reduces mortality risk. Difference in **b** heat-attributable and **d** cold-attributable mortality impact between SG and emissions reductions. Red indicates regions where mortality risk is higher in a world cooled with SG. Blue indicates regions where mortality risk is lower in a world cooled with SG. Panels **a** and **b** report impacts as deaths per 100,000 while Panels **c** and **d** report impacts as deaths per area, converting mortality rates to number of deaths using population in 2080. Maps present results for the FLOR climate model simulations. Zonal averages for both the FLOR and GLENS climate model simulations are shown to the right of each map. Estimates for the GLENS climate model are averaged over the 2050-2059 decade.

C.2 GLENS Climate Model



(a)



(b)

Figure S10 | Global temperature-attributable mortality - GLENS. (a) Change in global temperature-attributable mortality relative to 2010-2019 for the GLENS climate model simulation. Income growth and climate adaptation scenarios do not include adaptation costs. (b) Change in global temperature-attributable mortality relative to 2010-2019 for the GLENS climate model simulation compared to estimates from Carleton et al. (2022). Estimates with climate adaptation include adaptation costs. For both subplots, line shows median estimate and shading represents 25th to 75th percentile range. Box and whisker plots present median, interquartile range, and 10 to 90 percentile range for 2097 as line, box, and whiskers, respectively.

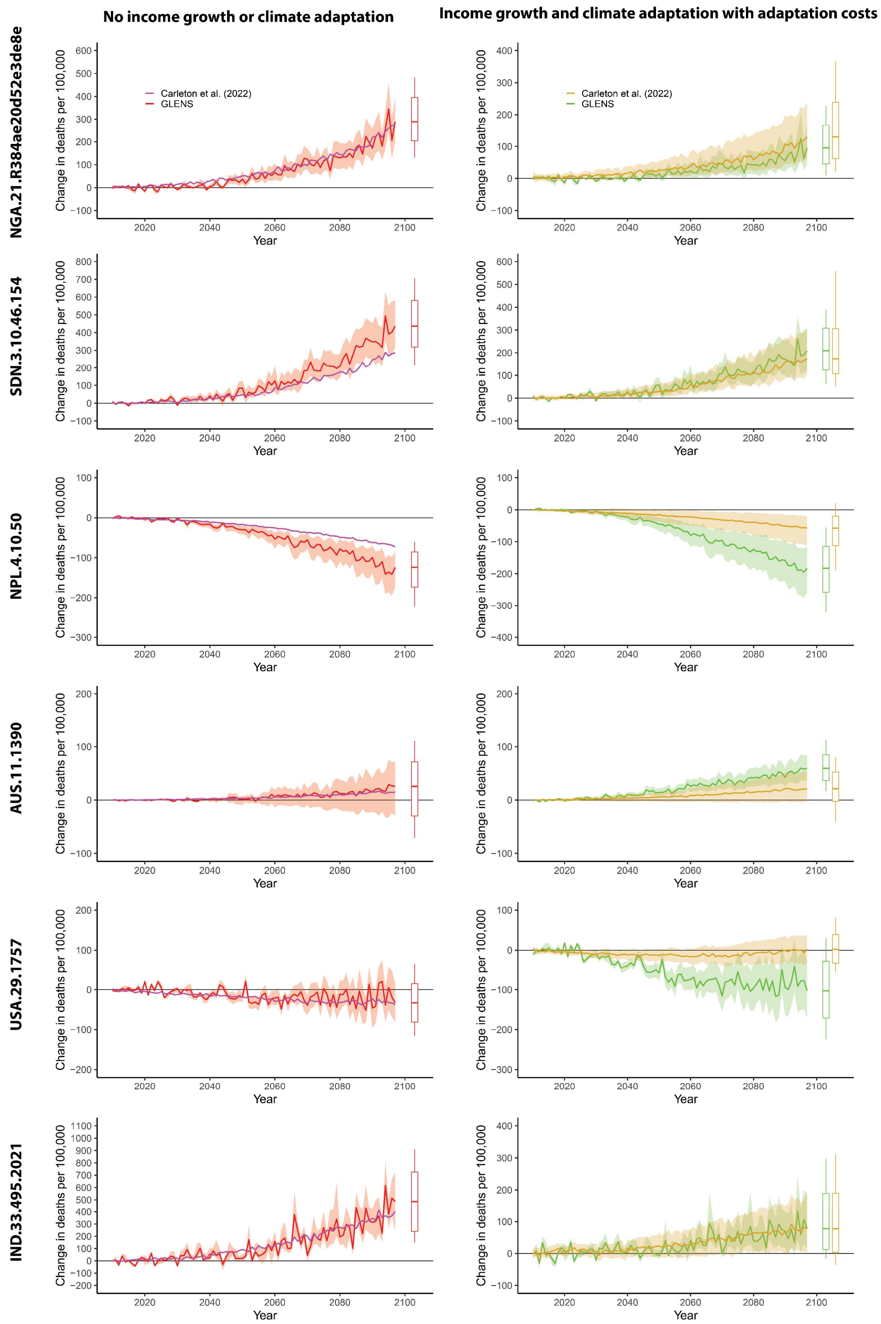


Figure S11 | Regional temperature-attributable mortality - GLENS. Change in temperature-attributable mortality relative to 2010-2019 for 6 regions for the GLENS climate model simulation compared to estimates from Carleton et al. (2022). Line represents mean estimates and shading represents 25th to 75th percentile range.Box and whisker plots present median, interquartile range, and 10 to 90 percentile range as line, box, and whiskers, respectively. Box and whisker plots present median, interquartile range, and 10 to 90 percentile range for 2097 as line, box, and whiskers, respectively.

	Decade						
	2030-2039	2040-2049	2050-2059	2060-2069	2070-2079	2080-2089	2090-2097
T RCP8.5 (°C)	15.8	16.5	17.1	17.7	18.4	19.1	19.7
ΔT for solar geoengineering	-0.8	-1.5	-2.1	-2.7	-3.3	-4	-4.7
SG Mortality Rate Impact per 1°C (No Adapt)	-4.2	-2.3	-8.8	-17.1	-19.9	-25.2	-31.7
SG Mortality Rate Impact per 1°C (Inc Growth + Clim Adapt)	1.3	2.9	-0.1	-3.2	-4	-5.5	-7
ΔT for emissions reductions	-1.1	-1.9	-2.5	-3.1	-3.8	-4.4	-5.1
ER Mortality Rate Impact per 1°C (No Adapt)	-1.8	-4.1	-8.1	-14.3	-18.2	-23.8	-29.9
ER Mortality Rate Impact per 1°C (Inc Growth + Clim Adapt)	3.5	2.3	0.9	-1.8	-2.9	-4.7	-6.1
r_M (No Adapt)	1.23	1.08	1.14	1.19	1.11	1.07	1.06
r_M (Inc Growth + Clim Adapt)	0.95	1.03	1.07	1.18	1.11	1.1	1.1

Table S2 | Mortality impact across decades - GLENS. By decade, displays global mean surface temperature under RCP8.5 scenario, change in global mean surface temperature for SG or emissions reductions, corresponding impacts on temperature-attributable mortality rates normalized per degree of cooling, and the ratio of SG normalized mortality rate impact relative to emissions reductions. Temperature and temperature changes are in °C. Mortality rate impacts normalized per degree of cooling are in deaths per 100,000 per 1°C. Metrics for 2050-2059 correspond to those used in the text.

D Normalizing by local cooling

In the text, we present results of the temperature-attributable mortality impacts where we normalize the mortality rate impact by the change in global mean surface temperature. This linearizes our results in a way that could be used in an Integrated Assessment Model, for example. Here, we present alternative results where instead of normalizing by the change in global mean surface temperature, we normalize mortality rate impacts for each impact region by the change in each respective regions' mean surface temperature.

We can also summarize the global impact of SG and the relative global impact of SG in comparison to emissions reductions when regional impacts are normalized per degree of regional cooling by weighting regional mortality rate impacts by their population in 2080. While unrealistic, this approximates the impact of uniform cooling of 1°C everywhere, as opposed to uniform GHG concentration accumulation or uniform SG deployment which have an uneven cooling effect. With 2080 SSP3 income levels and climate adaptation to each respective climate scenario, the global impact of SG is a reduction in mortality rates of 2.5 per 100,000 per 1°C per year (90% CI: [-9.9,21.0]). With 2015 SSP3 income levels and adaptation to 1990s climate, the global impact of SG is a reduction in mortality rates of 17.5 per 100,000 per 1°C per year (90% CI: [-3.9,43.0]). Comparing the regionally normalized impact of SG to the regionally normalized impact of emissions reductions, we estimate that with 2080 SSP3 income levels and climate adaptation to each respective climate scenario SG reduces mortality rates by 0.6 more than emissions reductions (90% CI: [-14.3,10.3]). With 2015 SSP3 income levels and adaptation to 1990s climate, we estimate SG reduces mortality rates by 1.3 more than emissions reductions (90% CI: [-17.8,6.3]).

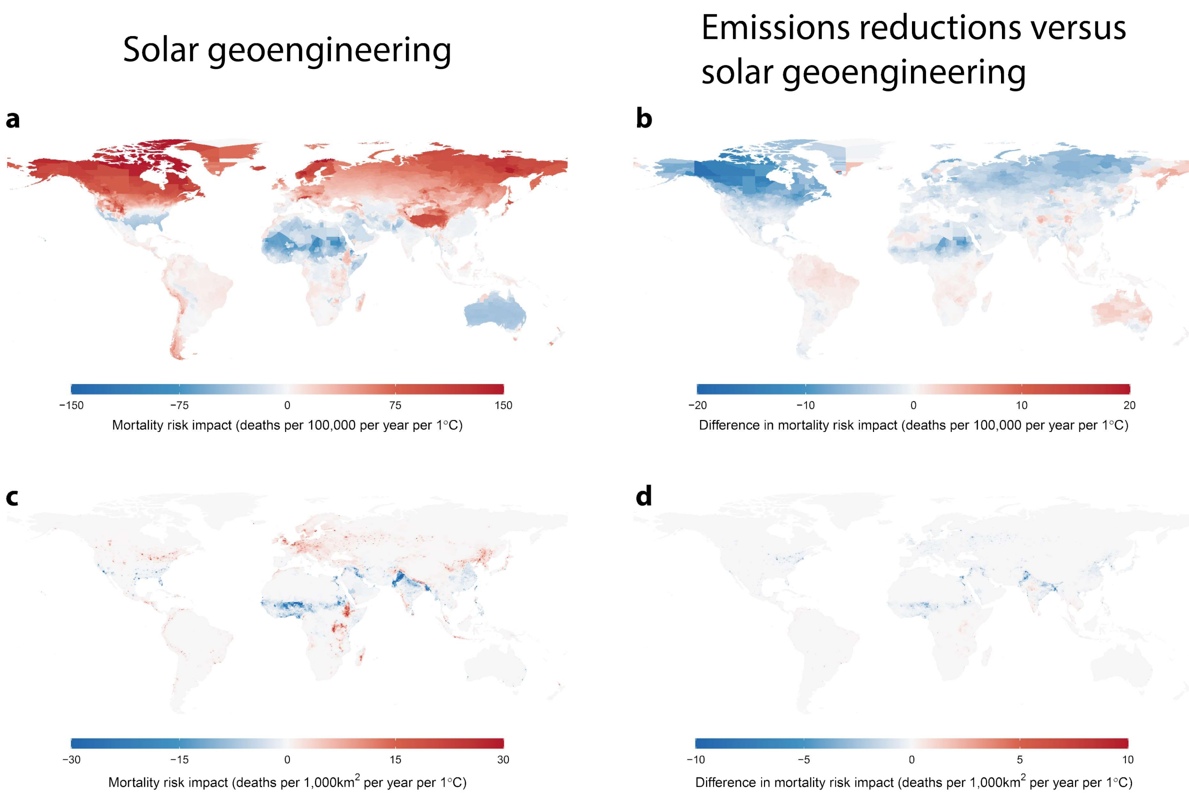


Figure S12 | Mortality Risk Impact Normalized by Regional Cooling (Income Growth). This figure is an alternative to Figure S8 where mortality rate impacts are normalized by local cooling rather than global mean cooling. Estimates are for the FLOR climate model simulations. Panels **a** and **c** show the impact of SG on temperature-attributable mortality rates normalized by the change in mean surface temperature in each respective impact region. Red indicates regions SG increases mortality risk. Blue indicates regions SG reduces mortality risk. Panels **b** and **d** show the difference in mortality risk impact between SG and emissions reductions, again normalized by mean surface temperature change in each impact region. Red indicates regions where mortality risk is higher in a world cooled with SG. Blue indicates regions where mortality risk is lower in a world cooled with SG. Panels **a** and **b** report impacts as deaths per 100,000 while Panels **c** and **d** report impacts as deaths per area, converting mortality rates to number of deaths using population in 2080.

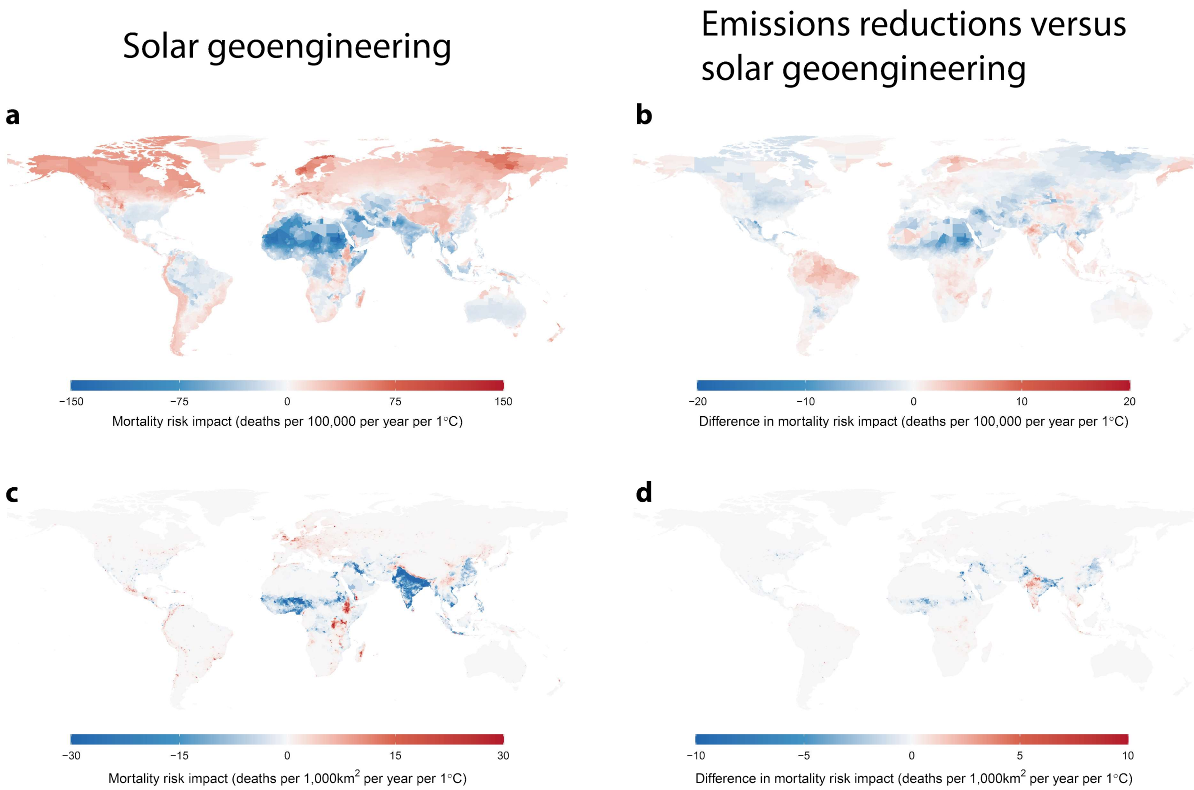


Figure S13 | Mortality Risk Impact Normalized by Regional Cooling (No Adaptation). This figure is an alternative to Figure 1 where mortality rate impacts are normalized by local cooling rather than global mean cooling. Estimates are for the FLOR climate model simulations. Panels **a** and **c** show the impact of SG on temperature-attributable mortality rates normalized by the change in mean surface temperature in each respective impact region. Red indicates regions SG increases mortality risk. Blue indicates regions SG reduces mortality risk. Panels **b** and **d** show the difference in mortality risk impact between SG and emissions reductions, again normalized by mean surface temperature change in each impact region. Red indicates regions where mortality risk is higher in a world cooled with SG. Blue indicates regions where mortality risk is lower in a world cooled with SG. Panels **a** and **b** report impacts as deaths per 100,000 while Panels **c** and **d** report impacts as deaths per area, converting mortality rates to number of deaths using population in 2080.

E Risk-Risk Comparison

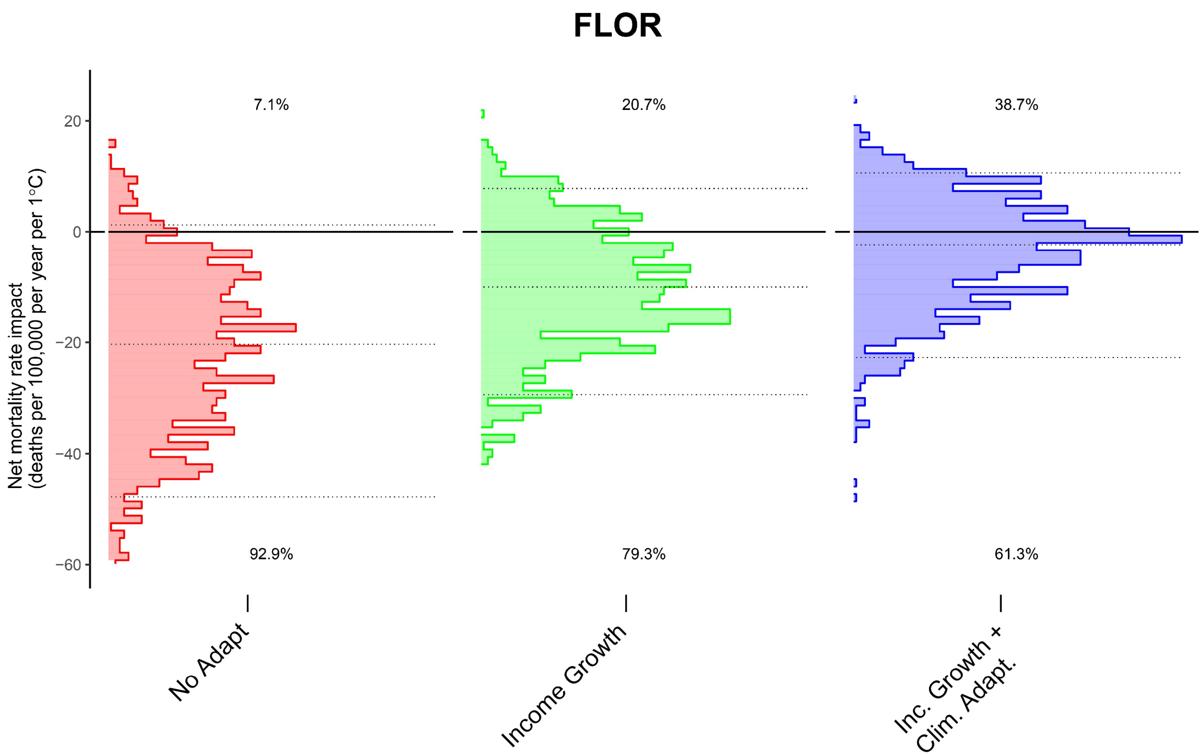


Figure S14 | Risk-Risk Comparison - FLOR Distribution of net mortality rate impact of solar geoengineering, measured as temperature-attributable mortality rate impact of solar geoengineering, normalized per degree of global mean cooling, net of direct mortality risk of solar geoengineering. A negative value indicates that the benefits of temperature-attributable mortality impact outweigh the direct mortality risks. Distributions of estimates with FLOR climate model for population distribution of SSP3 in 2080 across no adaptation or income growth, income growth to SSP3 income in 2080, and income growth and climate adaptation to each respective climate model experiment. Distributions are constructed by randomly sampling 1000 draws from Monte Carlo simulations of temperature-attributable mortality and from a normal distribution fit to the mean and 95% confidence interval of Eastham et al. (2018). For each distribution, the middle dotted line denotes the median estimate and the upper and lower dotted lines denote the 90% confidence interval. The numbers above and below each distribution denote the percentage of draws found to be above and below 0, respectively.

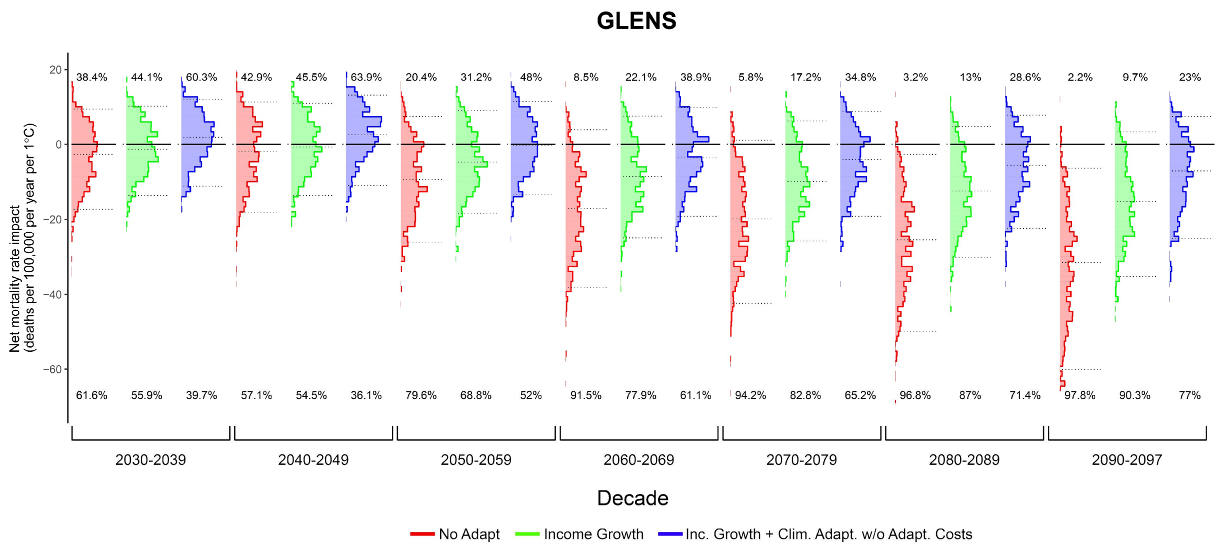


Figure S15 | Risk-Risk Comparison - GLENS Distribution of net mortality rate impact of solar geoengineering, measured as temperature-attributable mortality rate impact of solar geoengineering, normalized per degree of global mean cooling, net of direct mortality risk of solar geoengineering. A negative value indicates that the benefits of temperature-attributable mortality impact outweigh the direct mortality risks. Distributions of estimates for GLENS climate model across decades and across no adaptation or income growth, income growth under SSP3, and income growth and climate adaptation without adaptation costs. Distributions are constructed by randomly sampling 1000 draws from Monte Carlo simulations of temperature-attributable mortality and from a normal distribution fit to the mean and 95% confidence interval of Eastham et al. (2018). For each distribution, the middle dotted line denotes the median estimate and the upper and lower dotted lines denote the 90% confidence interval. The numbers above and below each distribution denote the percentage of draws found to be above and below 0, respectively.

F Alternative SSPs

In the text we present results using population and income from SSP3 projections. Here we present alternative results for different SSPs. Specifically, we consider SSP2 (Figures S16-S17 and Tables S3-S4) and SSP5 (Figures S18-S19 and Tables S5-S6) for the FLOR climate model simulations.

F.1 SSP2

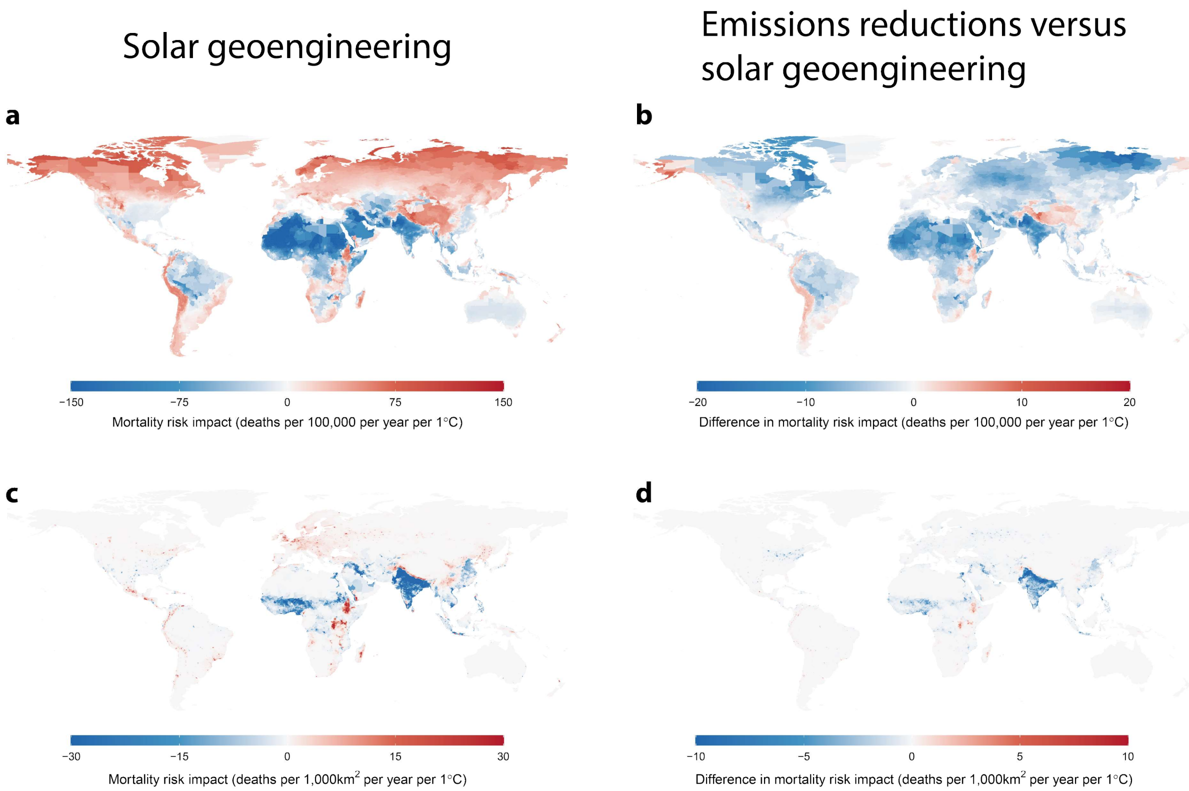


Figure S16 | Mortality Risk Impact – No Adaptation (SSP2). Panels **a** and **c** show the impact of SG on temperature-attributable mortality under the assumption of no income growth or climate adaptation. Red indicates regions SG increases mortality risk. Blue indicates regions SG reduces mortality risk. Panels **b** and **d** show the difference in mortality risk impact between SG and emissions reductions. Red indicates regions where mortality risk is higher in a world cooled with SG. Blue indicates regions where mortality risk is lower in a world cooled with SG. Panels **a** and **b** report impacts as deaths per 100,000 while Panels **c** and **d** report impacts as deaths per area, converting mortality rates to number of deaths using population in 2080. Estimates are for the FLOR climate model simulations.

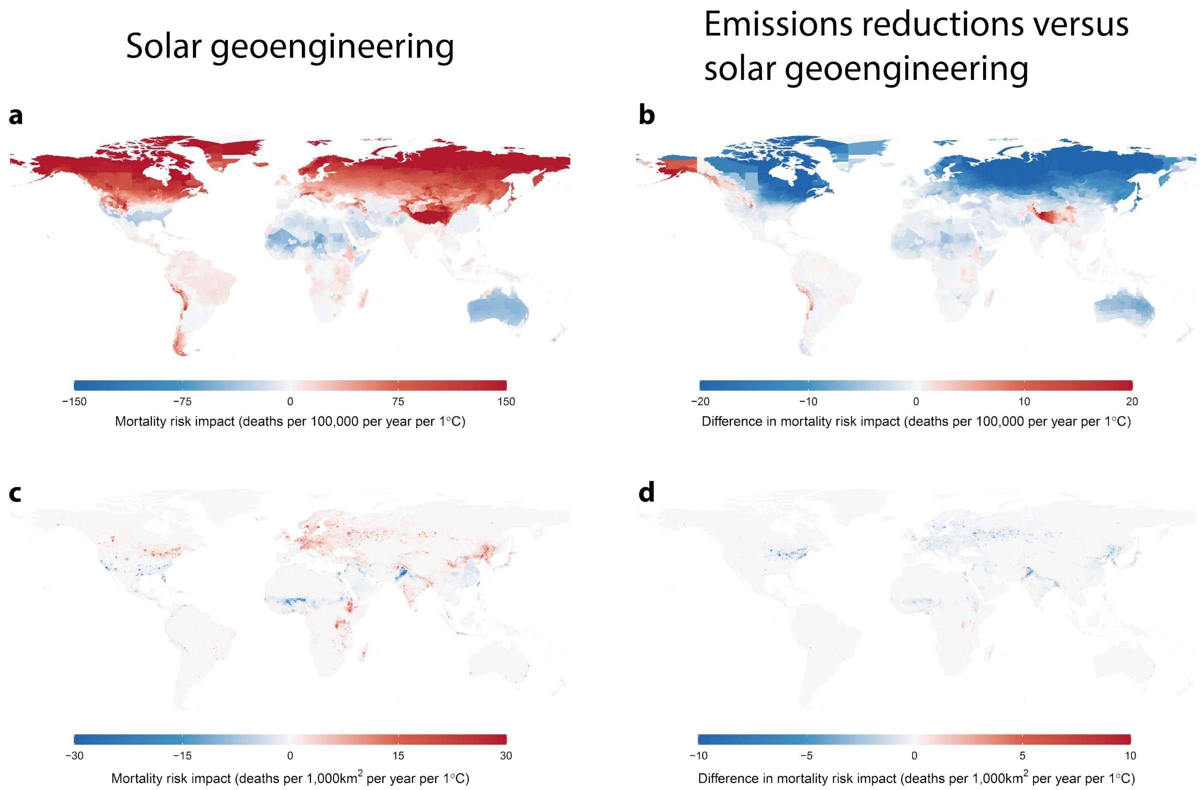


Figure S17 | Mortality Risk Impact – Income Growth + Climate Adaptation (SSP2). Panels **a** and **c** show the impact of SG on temperature-attributable mortality under the assumption of income growth and climate adaptation. Red indicates regions SG increases mortality risk. Blue indicates regions SG reduces mortality risk. Panels **b** and **d** show the difference in mortality risk impact between SG and emissions reductions. Red indicates regions where mortality risk is higher in a world cooled with SG. Blue indicates regions where mortality risk is lower in a world cooled with SG. Panels **a** and **b** report impacts as deaths per 100,000 while Panels **c** and **d** report impacts as deaths per area, converting mortality rates to number of deaths using population in 2080. Estimates are for the FLOR climate model simulations.

	Percentile						
	0.05	0.1	0.25	0.5	0.75	0.9	0.95
SG Mortality Rate Impact per 1°C (No Adapt)	-64.62139	-55.8423	-43.1356	-27.74417	-12.81501	0.73255	6.486397
SG Mortality Rate Impact per 1°C (Inc Growth)	-26.77006	-21.21526	-11.55163	-2.425382	6.098014	12.05445	16.21388
SG Mortality Rate Impact per 1°C (Inc Growth + Clim Adapt)	-19.40049	-13.38923	-4.921588	3.127559	8.985813	13.78137	17.38038
SG - ER Difference in Mortality Rate Impact per 1°C (No Adapt)	-10.29723	-8.65435	-5.889532	-3.626291	-1.317373	0.834308	2.586465
SG - ER Difference in Mortality Rate Impact per 1°C (Inc Growth)	-3.569263	-2.910281	-1.929478	-0.951162	-0.050568	0.844778	1.551274
SG - ER Difference in Mortality Rate Impact per 1°C (Inc Growth + Clim Adapt)	-4.028614	-3.329104	-2.300852	-1.289737	-0.212247	0.781623	1.549103
r_M (No Adapt)	0.621894	0.899637	1.04604	1.138929	1.246894	1.465001	1.746203
r_M (Inc Growth)	0.452017	0.745232	0.951337	1.085645	1.184239	1.381117	1.690873
r_M (Inc Growth + Clim Adapt)	-0.030883	0.601202	0.944525	1.153332	1.326716	1.790817	2.25047

Table S3 | Global Mortality Rate Impact – SSP2. Table shows percentiles of estimates of global mortality rate impact from solar geoengineering normalized per degree of global cooling, the difference in normalized mortality rate impact between solar geoengineering and emissions reductions, and the ratio of normalized mortality rate impact from solar geoengineering relative to emissions reductions. Estimates are for the FLOR climate model simulations assuming cooling in 2080 under SSP2. Population weights of regions are for SSP2 population distribution in 2080. Results are shown for no income growth or climate adaptation from 1990s (No Adapt), income growth to 2080 (Inc. Growth) and income growth to 2080 and adaptation to each respective climate model experiment (Inc. Growth + Clim. Adapt).

		Mean/Median Fraction of Global Population (%)			
		Impact of solar geo		Better off with solar geo or emissions reductions	
		Harmed	Benefit	ER	SG
No Adapt	Total	33/33	67/67	19/17	81/83
	Heat	0/0	100/100	3/3	97/97
	Cold	100/100	0/0	60/59	40/41
Inc. Growth	Total	39/50	61/50	23/19	77/81
	Heat	0/0	100/100	3/9	97/91
	Cold	99/99	1/1	56/59	44/41
Inc. Growth + Clim. Adapt	Total	43/54	57/46	26/23	74/77
	Heat	0/0	100/100	6/20	94/80
	Cold	89/83	11/17	55/49	45/51

Table S4 | Regional Mortality Rate Impact – SSP2. The left two columns show the percentage of the global population estimated to experience an increase in mortality rates with solar geoengineering (harmed) or a decrease in mortality rates (benefit). The right two columns show the percentage of the global population estimated to have lower mortality rates with emissions reduction (ER) or solar geoengineering (SG). Estimates are for the FLOR climate model simulations assuming cooling in 2080 under SSP2. Population weights of regions are for SSP2 population distribution in 2080. Results are shown for all temperature-, heat-, and cold-attributable mortality across no income growth or climate adaptation from 1990s (No Adapt), income growth to 2080 (Inc. Growth) and income growth to 2080 and adaptation to each respective climate model experiment (Inc. Growth + Clim. Adapt).

F.2 SSP5

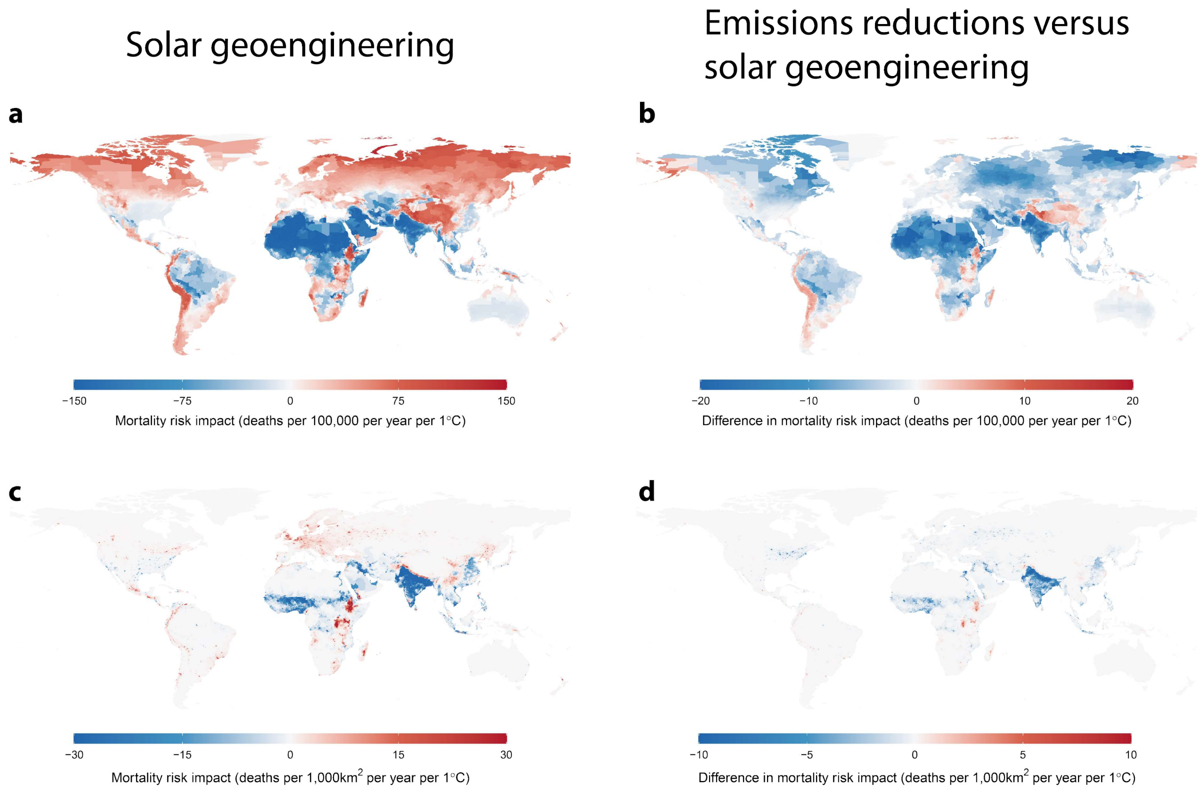


Figure S18 | Mortality Risk Impact – No Adaptation (SSP5). Panels **a** and **c** show the impact of SG on temperature-attributable mortality under the assumption of no income growth or climate adaptation. Red indicates regions SG increases mortality risk. Blue indicates regions SG reduces mortality risk. Panels **b** and **d** show the difference in mortality risk impact between SG and emissions reductions. Red indicates regions where mortality risk is higher in a world cooled with SG. Blue indicates regions where mortality risk is lower in a world cooled with SG. Panels **a** and **b** report impacts as deaths per 100,000 while Panels **c** and **d** report impacts as deaths per area, converting mortality rates to number of deaths using population in 2080. Estimates are for the FLOR climate model simulations.

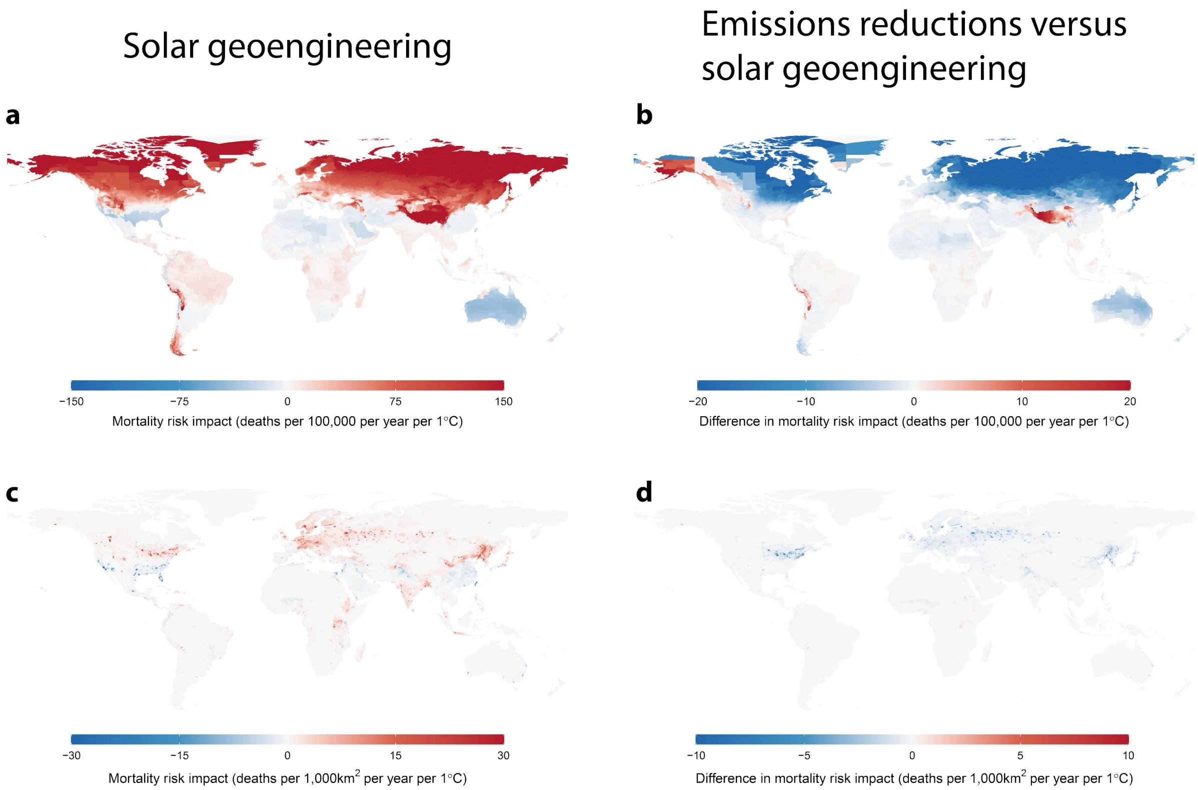


Figure S19 | Mortality Risk Impact – Income Growth + Climate Adaptation (SSP5). Panels **a** and **c** show the impact of SG on temperature-attributable mortality under the assumption of income growth and climate adaptation. Red indicates regions SG increases mortality risk. Blue indicates regions SG reduces mortality risk. Panels **b** and **d** show the difference in mortality risk impact between SG and emissions reductions. Red indicates regions where mortality risk is higher in a world cooled with SG. Blue indicates regions where mortality risk is lower in a world cooled with SG. Panels **a** and **b** report impacts as deaths per 100,000 while Panels **c** and **d** report impacts as deaths per area, converting mortality rates to number of deaths using population in 2080.

	Percentile						
	0.05	0.1	0.25	0.5	0.75	0.9	0.95
SG Mortality Rate Impact per 1°C (No Adapt)	-86.58076	-74.29336	-57.05386	-36.12393	-14.34813	3.587314	13.6342
SG Mortality Rate Impact per 1°C (Inc Growth)	-30.27964	-20.15716	-6.437082	2.778982	11.70686	18.50107	22.3843
SG Mortality Rate Impact per 1°C (Inc Growth + Clim Adapt)	-21.26118	-9.477604	-0.822951	5.52233	11.97582	18.45543	22.90103
SG - ER Difference in Mortality Rate Impact per 1°C (No Adapt)	-13.81186	-11.73407	-7.928028	-4.806561	-1.48807	1.187031	3.525094
SG - ER Difference in Mortality Rate Impact per 1°C (Inc Growth)	-3.718512	-2.82744	-1.844193	-0.727823	0.107711	1.181561	2.138936
SG - ER Difference in Mortality Rate Impact per 1°C (Inc Growth + Clim Adapt)	-4.255366	-3.49271	-2.460747	-1.459475	-0.538612	0.410634	1.284108
r_M (No Adapt)	0.586171	0.862792	1.03418	1.132817	1.242942	1.471244	1.754836
r_M (Inc Growth)	0.498078	0.735023	0.912827	1.039951	1.156084	1.372469	1.764567
r_M (Inc Growth + Clim Adapt)	-0.099673	0.589932	0.92535	1.147673	1.335776	1.843533	2.760411

Table S5 | Global Mortality Rate Impact – SSP5. Table shows percentiles of estimates of global mortality rate impact from solar geoengineering normalized per degree of global cooling, the difference in normalized mortality rate impact between solar geoengineering and emissions reductions, and the ratio of normalized mortality rate impact from solar geoengineering relative to emissions reductions. Estimates are for the FLOR climate model simulations assuming cooling in 2080 under SSP5. Population weights of regions are for SSP5 population distribution in 2080. Results are shown for no income growth or climate adaptation from 1990s (No Adapt), income growth to 2080 (Inc. Growth) and income growth to 2080 and adaptation to each respective climate model experiment (Inc. Growth + Clim. Adapt).

		Mean/Median Fraction of Global Population (%)			
		Impact of solar geo		Better off with solar geo or emissions reductions	
		Harmed	Benefit	ER	SG
No Adapt	Total	35/35	65/65	18/16	82/84
	Heat	0/0	100/100	3/3	97/97
	Cold	100/100	0/0	56/56	44/44
Inc. Growth	Total	50/65	50/35	25/26	75/74
	Heat	0/0	100/100	4/22	96/78
	Cold	98/98	2/2	51/56	49/44
Inc. Growth + Clim. Adapt	Total	49/60	51/40	28/24	72/76
	Heat	0/6	100/94	8/39	92/61
	Cold	82/73	18/27	48/42	52/58

Table S6 | Regional Mortality Rate Impact – SSP5. The left two columns show the percentage of the global population estimated to experience an increase in mortality rates with solar geoengineering (harmed) or a decrease in mortality rates (benefit). The right two columns show the percentage of the global population estimated to have lower mortality rates with emissions reduction (ER) or solar geoengineering (SG). Estimates are for the FLOR climate model simulations assuming cooling in 2080 under SSP5. Population weights of regions are for SSP5 population distribution in 2080. Results are shown for all temperature-, heat-, and cold-attributable mortality across no income growth or climate adaptation from 1990s (No Adapt), income growth to 2080 (Inc. Growth) and income growth to 2080 and adaptation to each respective climate model experiment (Inc. Growth + Clim. Adapt).