

Supplementary Materials:

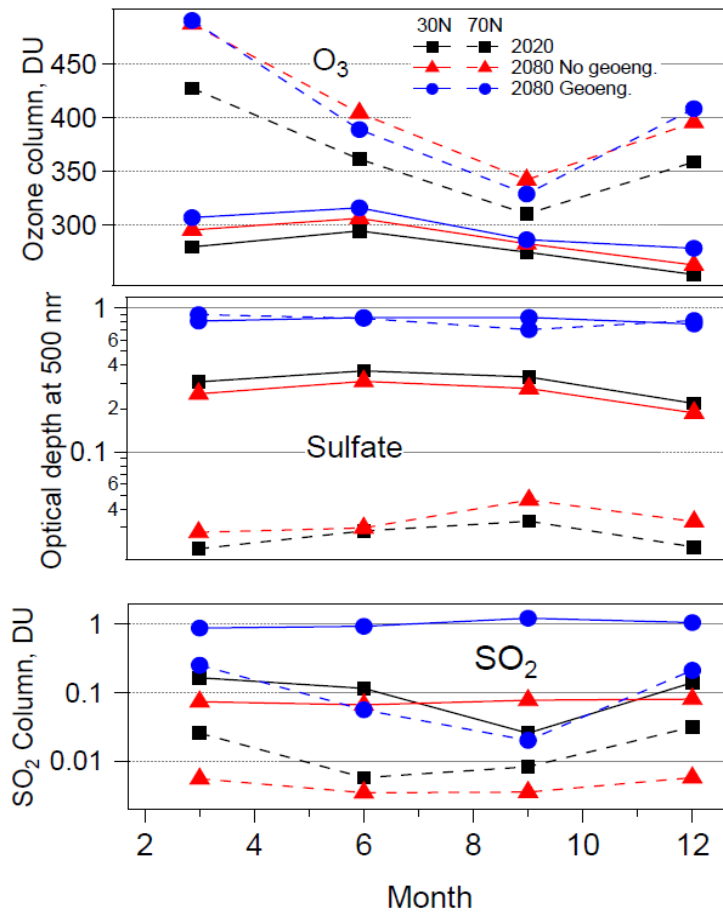


Figure S1. Seasonally resolved differences in column-integrated amounts of O₃, sulfate, and SO₂ for current conditions (black squares), and in 2080 with (blue circles) or without (red triangles) geoengineering (RCP8.5), for 30N (solid) and 70N (dashed).

Table S1. Effect^(a) of cloud cover on future changes in surface photochemical ($j_{\text{O}1\text{D}}$ and $j_{\text{NO}2}$) and photobiological (i_{DNA} , UVI, and PAR) radiation, as ratios of values in 2080 to 2020, with and without geoengineering by stratospheric SO₂ injections. Overcast skies with cloud between 4 and 5 km; optical depth = 32. Based on daily average values for the months indicated.

30N	Without Geoengineering					With Geoengineering				
	$j_{\text{O}1\text{D}}$	$j_{\text{NO}2}$	i_{DNA}	UVI	PAR	$j_{\text{O}1\text{D}}$	$j_{\text{NO}2}$	i_{DNA}	UVI	PAR
March	0.90	1.00	0.87	0.92	1.00	0.77	0.97	0.71	0.81	0.96
June	0.93	1.00	0.90	0.94	1.00	0.78	0.97	0.73	0.82	0.97
September	0.94	1.00	0.92	0.95	1.00	0.80	0.97	0.76	0.84	0.96
December	0.93	1.00	0.91	0.95	1.00	0.77	0.96	0.73	0.82	0.96
70N										
March	0.82	1.00	0.81	0.90	0.99	0.79	0.92	0.78	0.85	0.93
June	0.83	1.00	0.79	0.88	0.99	0.77	0.94	0.75	0.83	0.94
September	0.85	1.00	0.82	0.91	0.99	0.90	0.94	0.89	0.91	0.95
December	0.77	0.94	0.76	0.85	0.95	0.67	0.58	0.63	0.67	0.30

^(a) Same as Table 4 of main text, but with clouds rather than cloud-free skies.