

Supplementary Materials:

Impact of Climate-Driven Land-Use Change on O₃ and PM Pollution by Driving BVOC Emissions in China in 2050

Song Liu ^{1,2}, Shovan Kumar Sahu ^{1,3}, Shuping Zhang ^{1,2}, Shuchang Liu ^{1,4}, Yisheng Sun ^{1,2}, Xiliang Liu ⁵, Jia Xing ^{1,2,*}, Bin Zhao ^{1,2}, Hongliang Zhang ⁶, and Shuxiao Wang ^{1,2}

2. Method

2.2 Preprocessing of LUH2 data

Table S1. Fitting results of the relationship between FPAR and LAI.

Month	Region 1		Region 2		Region 3		Region 4	
	<i>k</i>	R ²	<i>k</i>	R ²	<i>k</i>	R ²	<i>k</i>	R ²
1	0.393	0.980	0.467	0.894	0.713	0.876	1.056	0.948
2	0.381	0.979	0.454	0.922	0.619	0.885	0.928	0.955
3	0.354	0.981	0.422	0.930	0.556	0.904	0.816	0.959
4	0.343	0.984	0.391	0.946	0.490	0.927	0.696	0.964
5	0.340	0.987	0.375	0.965	0.417	0.946	0.509	0.956
6	0.354	0.986	0.390	0.975	0.407	0.959	0.454	0.976
7	0.372	0.982	0.409	0.962	0.436	0.958	0.467	0.979
8	0.374	0.980	0.420	0.960	0.459	0.958	0.512	0.974
9	0.375	0.980	0.429	0.965	0.488	0.951	0.591	0.939
10	0.383	0.978	0.441	0.942	0.550	0.919	0.892	0.937
11	0.396	0.977	0.451	0.919	0.661	0.871	0.996	0.947
12	0.396	0.980	0.472	0.885	0.710	0.865	1.070	0.944

3. Results and Discussions

3.3. Changes in O₃ and PM concentrations in response to land-use changes

Table S2. Impact of land-use changes on annual average O₃ (unit: ppbv) and PM (unit: µg m⁻³) concentrations in typical regions under SSP scenarios.

Region	Variable	SSP126	SSP585
JJJ	O ₃	-0.16	-0.08
	O ₃ MAX	-0.23	-0.07
	PM _{2.5}	-0.11	-0.04
	PM ₁₀	-0.12	-0.04
YRD	O ₃	0.06	-0.10
	O ₃ MAX	0.10	-0.23

PRD	PM _{2.5}	0.00	-0.12
	PM ₁₀	0.00	-0.15
	O ₃	0.07	-0.12
	O ₃ MAX	0.13	-0.21
	PM _{2.5}	-0.02	-0.19
SCH	PM ₁₀	-0.03	-0.24
	O ₃	-0.09	-0.08
	O ₃ MAX	-0.24	-0.12
	PM _{2.5}	-0.10	-0.10
	PM ₁₀	-0.13	-0.14
HUZ	O ₃	0.01	-0.12
	O ₃ MAX	-0.05	-0.09
	PM _{2.5}	-0.04	-0.18
	PM ₁₀	-0.05	-0.23
	O ₃	-0.04	-0.07
ECH	O ₃ MAX	0.06	-0.14
	PM _{2.5}	-0.03	-0.08
	PM ₁₀	-0.04	-0.10
	O ₃	-0.06	-0.04
	O ₃ MAX	0.07	-0.12
CHA	PM _{2.5}	-0.01	-0.04
	PM ₁₀	-0.01	-0.06

Table S3. Impact of land-use change on O₃ (unit: ppbv) and PM (unit: µg m⁻³) concentrations in typical regions in summer under SSP scenarios.

Region	Variable	SSP126	SSP585
JJJ	O ₃	-0.36	-0.19
	O ₃ MAX	-0.48	-0.15
	PM _{2.5}	-0.20	-0.07
	PM ₁₀	-0.24	-0.08
	O ₃	0.18	-0.23
YRD	O ₃ MAX	0.28	-0.58
	PM _{2.5}	0.01	-0.22
	PM ₁₀	-0.01	-0.27
	O ₃	0.10	-0.19
PRD	O ₃ MAX	0.02	-0.33
	PM _{2.5}	-0.01	-0.19

SCH	PM ₁₀	-0.02	-0.25
	O ₃	-0.21	-0.15
	O ₃ MAX	-0.65	-0.21
	PM _{2.5}	-0.17	-0.12
HUZ	PM ₁₀	-0.24	-0.17
	O ₃	0.09	-0.23
	O ₃ MAX	-0.08	-0.17
	PM _{2.5}	-0.04	-0.28
ECH	PM ₁₀	-0.09	-0.33
	O ₃	-0.11	-0.15
	O ₃ MAX	0.10	-0.17
	PM _{2.5}	-0.06	-0.11
CHA	PM ₁₀	-0.08	-0.13
	O ₃	-0.17	-0.13
	O ₃ MAX	0.10	-0.17
	PM _{2.5}	-0.02	-0.05
	PM ₁₀	-0.03	-0.06

3.4. Projections under carbon neutral scenario of China

Table S4. Monthly average BVOC and soil-source NO emissions under carbon scenario.

Month	BVOC (Unit: GgC)	soil-source NO (Unit: Mmol)
1	301.1	146.2
2	359.9	188.7
3	745.1	430.3
4	1520.6	944.0
5	2478.9	1832.6
6	4000.6	3069.1
7	5229.4	3750.4
8	4564.5	3227.2
9	2449.7	1503.0
10	1388.2	605.4
11	636.8	272.3
12	308.9	133.2
Total	23983.5	16102.3

Acknowledgments: This work was supported in part by the National Natural Science Foundation of China (4190070530 & 51861135102). This work was completed on the “Explorer 100” cluster system of Tsinghua National Laboratory for Information Science and Technology.