Fig. S1. The cover fraction of 8 plant functional types (PFTs) from the LUH2 used in

the ModelE2-YIBs model.
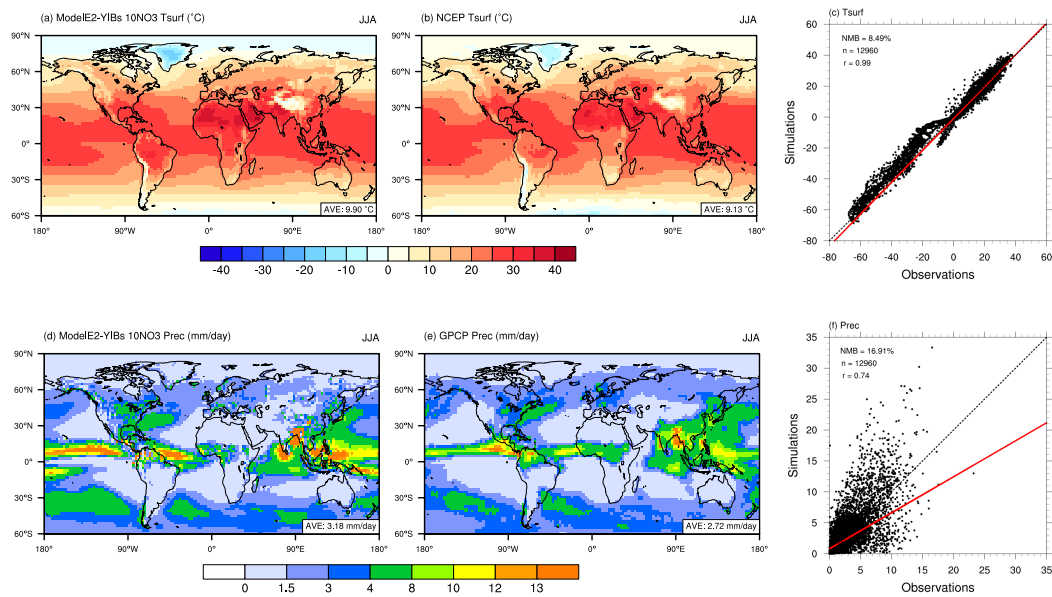
Fig. S2. Evaluation of the summertime (June-August) meteorological field in 2010s simulated by the ModelE2-YIBs model. Surface temperature (top) and precipitation (bottom) from the simulation 10NO3 (left) and reanalysis data (middle) are compared. The correlation coefficients (r), normalized mean bias (NMB), and number of grid cells (n) for the comparisons are calculated between the simulations and observations are listed on the scatter panels.

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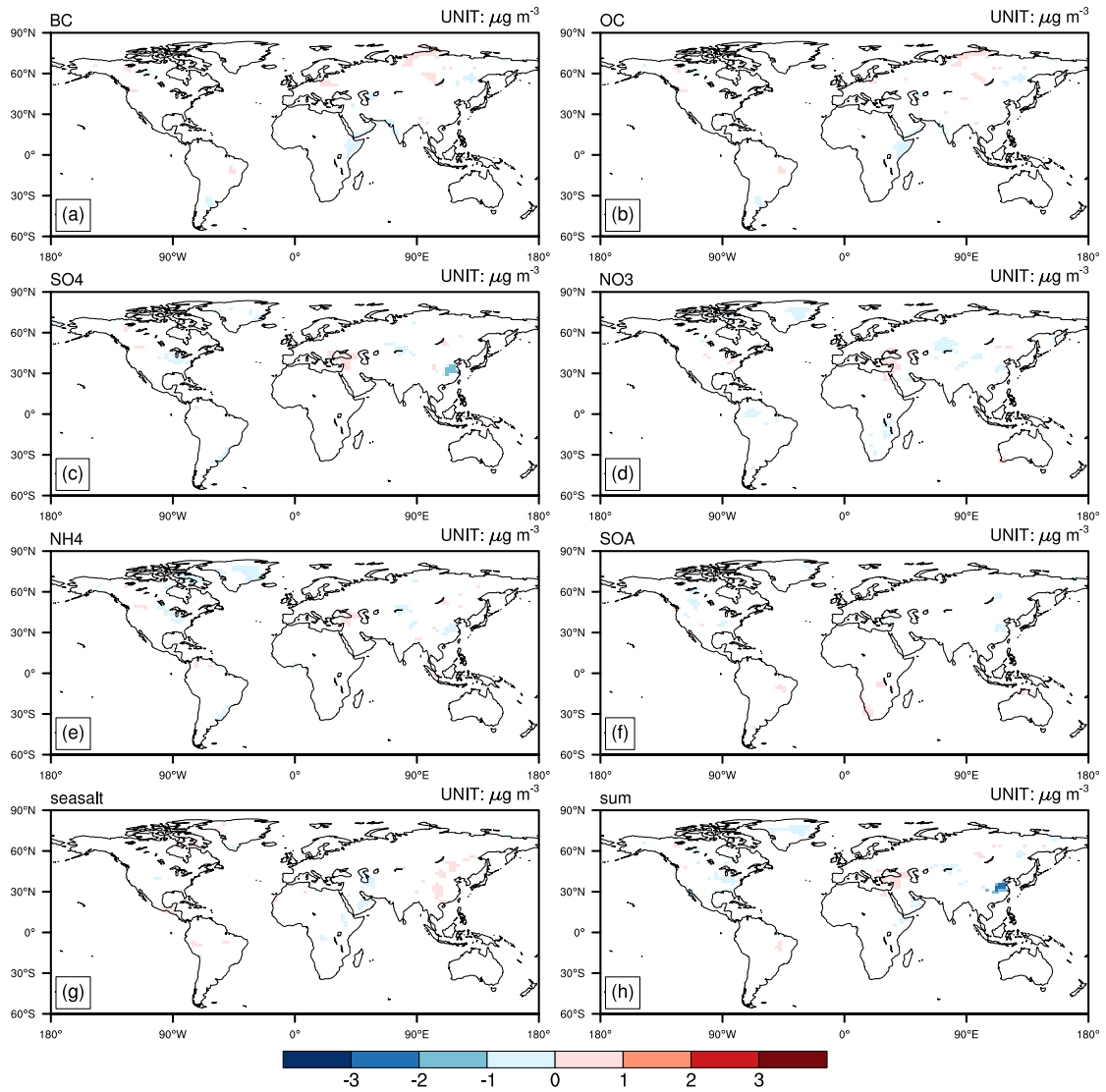
Fig. S3. Changes in 7 types (a-g) summer PM$_{2.5}$ (without silts) and their sum (h) in 2010s in the model by ozone-vegetation interactions. Results shown are the differences of PM$_{2.5}$ between 10HO3 and 10NO3. Only the significant changes ($p < 0.05$) are presented.

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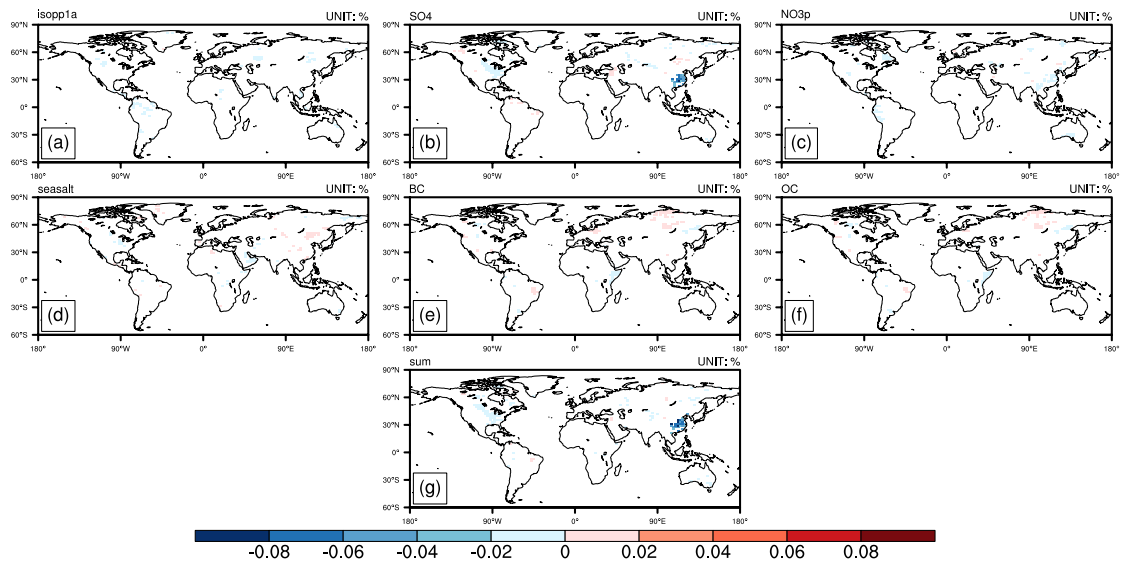
Fig. S4. Changes in 6 types (a-f) summer aerosol optical depth (AOD) and their sum

(g) in 2010s in the model by O_3-vegetation interactions. Results shown are the

differences of AOD between 10HO3 and 10NO3. Only the significant changes ($p <$

0.05) are presented.

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Table S1. Parameters for O_3 damage scheme

PFT[a]	TDA	CRAC3	CRAC4	SHR	DBF	ENF	TRF	CRO	
Carboxylation	C_3	C_3	C_4	C_3	C_3	C_3	C_3	C_3	C_4
$F_{O3,crit}$ (mmol m^{-2} s^{-1})	1.6	5	5	1.6	1.6	1.6	1.6	5	5
a_h [b] (mmol m^{-2})	0.1	1.4	0.735	0.1	0.15	0.075	0.15	1.4	0.735

[a] Plant function types (PFTs) are tundra (TDA), C_3 grassland (GRAC3), C_4 savanna/grassland (GRAC4), shrubland (SHR), deciduous broadleaf forest (DBF), evergreen needleleaf forest (ENF), tropical rainforest (TRF), and cropland (CRO).

[b] Parameters a_h is the high O_3-damaging sensitivities.

27 **Table S2.** Relative changes of terrestrial ecosystems in two major geographic regions

28 in response to O_3-vegetation interactions in model

Region	GPP	Stomatal Conductance	LAI
eastern China	-18.43%	-30.62%	-4.53%
eastern U.S.	-16.12%	-25.65%	-5.87%

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30 **Table S3.** Changes of climatic variables in two major geographic regions in response

31 to O_3-vegetation interactions in model

Region	Surface Air Temperature (unit: °C)	Precipitation (unit: mm day^{-1})	Sensible Heat Flux (W m^{-2})
eastern China	0.56	-0.79 (-16.18%)	7.12 (25.46%)
eastern U.S.	0.33	-0.45 (-9.82%)	6.3 (16.54%)

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33 **Table S4.** Changes of air pollution in two major geographic regions in response to O_3-

34 vegetation interactions in model

Region	O_3 (ppbv)	$PM_{2.5}$ (unit: μg m^{-3})	AOD
eastern China	1.26	-1.94 (-8.52%)	-0.06 (-14.67%)
eastern U.S.	0.98	-0.27 (-6.01%)	-0.01 (-8.25%)

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