Supplemental of

Modeling Trans-Pacific Transport and Stratospheric Intrusion using Hemispheric CMAQ on April 2010: Part 2. Examination of Emission Impacts based on the Higher-order Decoupled Direct Method

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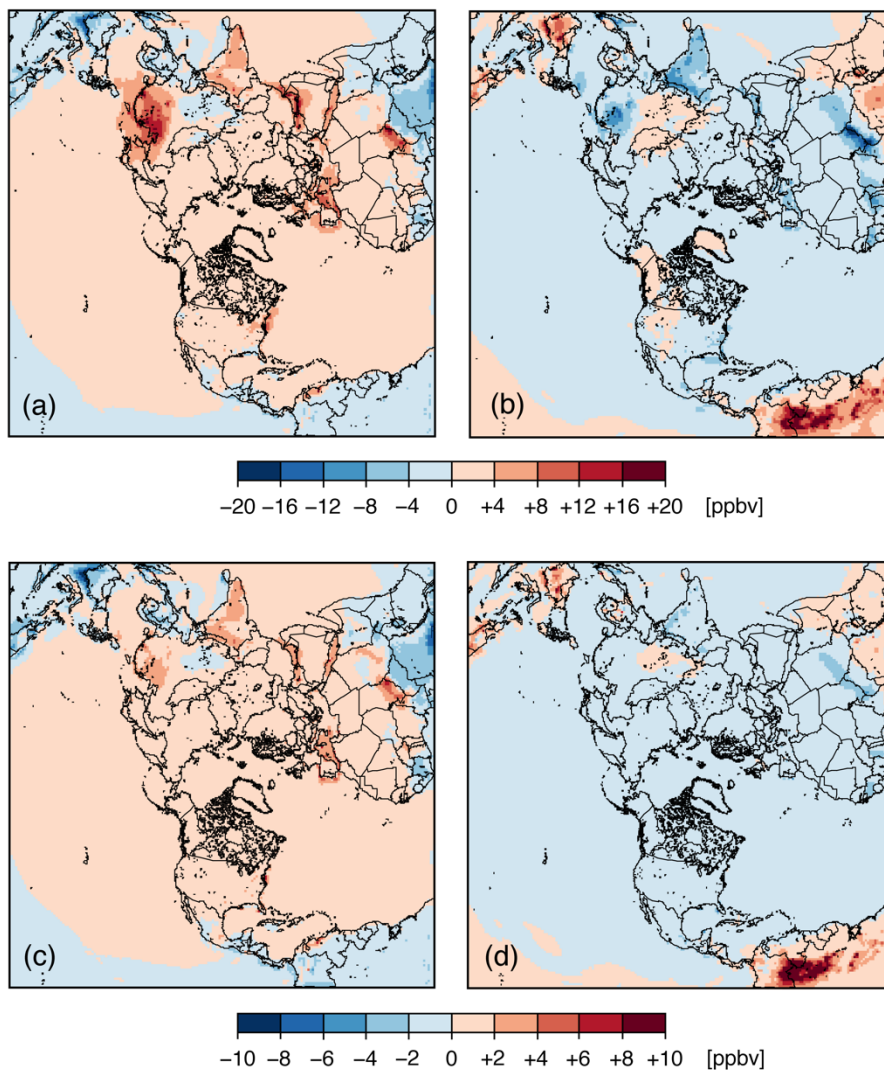
Figure S1. (Top) spatial distribution of the sensitivity coefficients of O_3 to (a) domain-wide VOC emissions as first-order, (b) same as (a) but as second-order during April 2010 (same figure with Fig. 1 (b) and (c)). (Bottom) spatial distribution of the sensitivity coefficients of O_3 to (c) domain-wide isoprene emissions as first-order, (d) same as (c) but as second-order during April 2010. Note the color scale is half of top panel.

Sensitivity coefficient of O₃ to emissions from U.S.A.
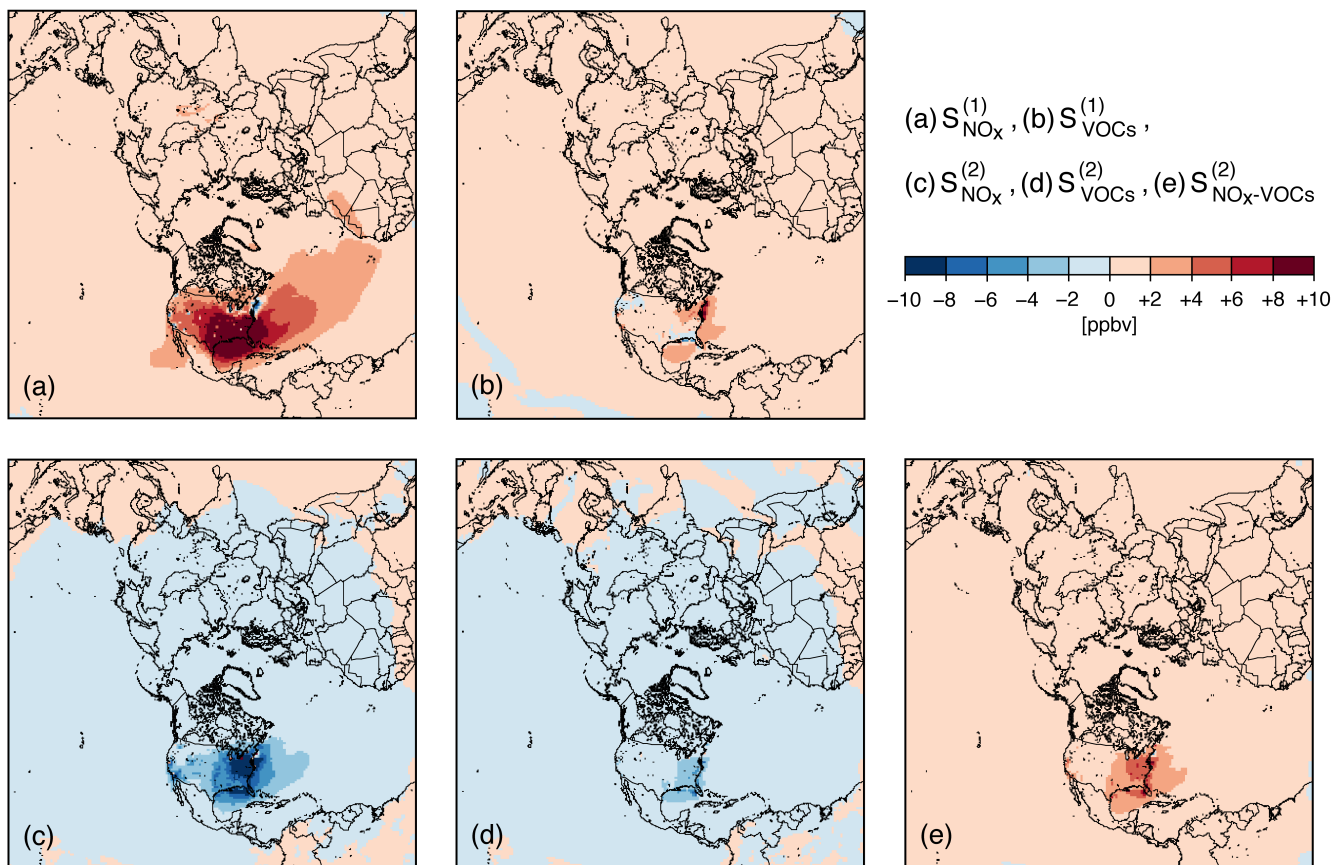
Figure S2. Spatial distribution of the sensitivity coefficients of O₃ to (a) NOₓ emissions from U.S.A as first-order, (b) VOC emissions from U.S.A as first-order, (c) same as (a) but as second-order, (d) same as (b) but as second-order, and (e) NOₓ and VOC emissions from U.S.A. during April 2010.

Sensitivity coefficient of O₃ to emissions from East Asia

(a) $S^{(1)}_{NO_x}$, (b) $S^{(1)}_{VOCs}$,

(c) $S^{(2)}_{NO_x}$, (d) $S^{(2)}_{VOCs}$, (e) $S^{(2)}_{NO_x\text{-}VOCs}$

−10 −8 −6 −4 −2 0 +2 +4 +6 +8 +10
[ppbv]
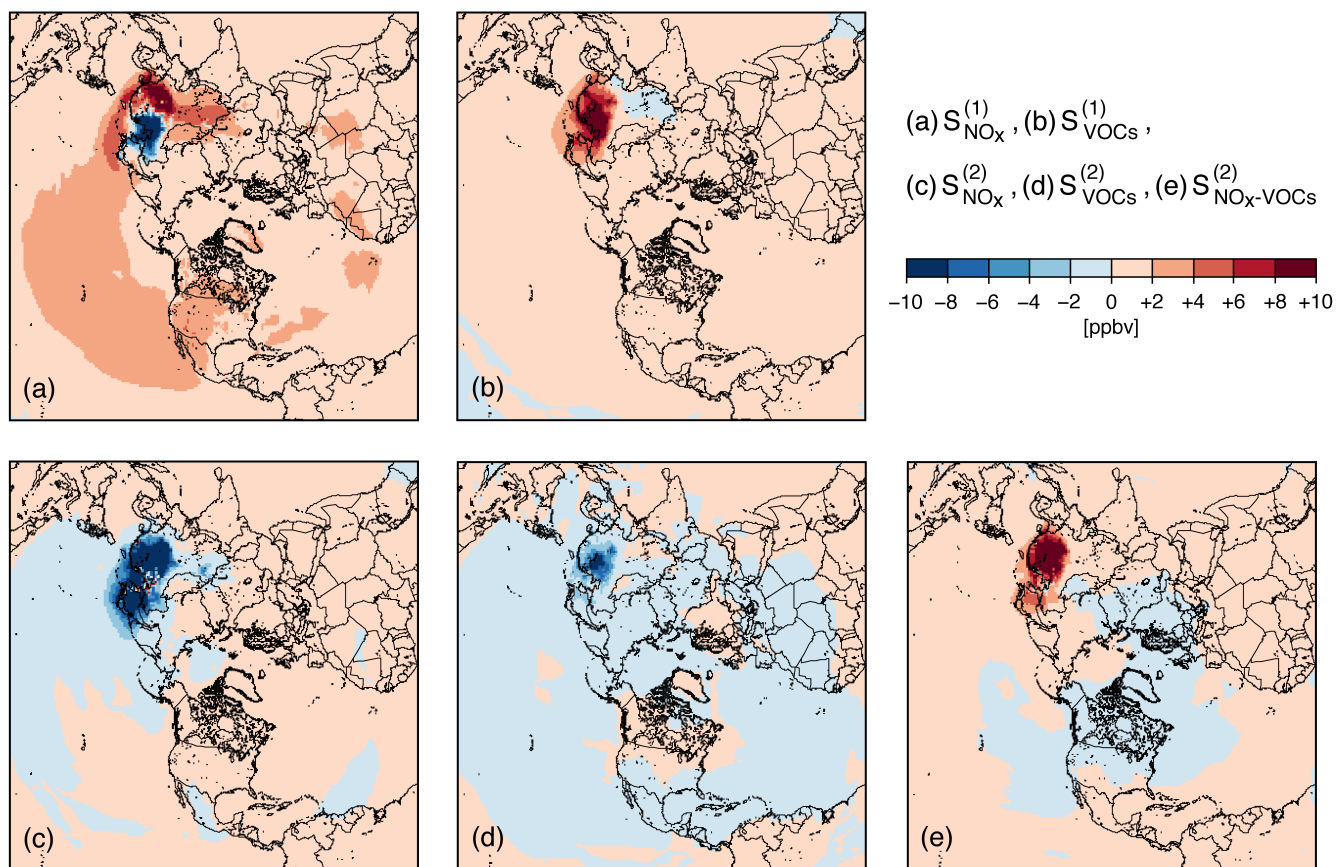
Figure S3. Spatial distribution of the sensitivity coefficients of O₃ to (a) NOₓ emissions from East Asia as first-order, (b) VOC emissions from East Asia as first-order, (c) same as (a) but as second-order, (d) same as (b) but as second-order, and (e) NOₓ and VOC emissions from East Asia during April 2010.

Table S1. Elevated CASTNET sites in an alphabetical order.

ID	Site name	State	Time Zone	Longitude (°)	Latitude (°)	Elevation (m a.s.l.)
BBE401	Big Band NP	TX	CST	−103.178	29.303	1052
CAN407	Canyonlands NP	UT	MST	−109.821	38.458	1809
CHA467	Chiricahua NM	AZ	MST	−109.389	32.009	1570
CNT169	Centennial	WY	MST	−106.240	41.365	3175
CON186	Converse Station	CA	PST	−116.913	34.194	1718
GRB411	Great Basin NP	NV	PST	−114.216	39.005	2060
GRC474	Grand Canyon NP	AZ	MST	−112.184	36.059	2073
GTH161	Gothic	CO	MST	−106.986	38.956	2915
JOT403	Joshua Tree NP	CA	PST	−116.389	34.070	1244
LAV410	Lassen Volcanic NP	CA	PST	−121.576	40.540	1756
MEV405	Mesa Verde NP	CO	MST	−108.490	37.198	2165
PAL190	Palo Duro	TX	CST	−101.665	34.881	1053
PET427	Petrified Forest	AZ	MST	−109.892	34.823	1723
PND165	Pinedake	WY	MST	−109.788	42.929	2386
PNF126	Cranberry	NC	EST	−82.045	36.105	1216
ROM206	Rocky Mountain NP Collocated	CO	MST	−105.546	40.278	2742
ROM406	Rocky Mountain NP	CO	MST	−105.546	40.278	2743
SHN418	Shenandoah NP	VA	EST	−78.435	38.523	1073
WNC429	Wind Cave NP	SD	MST	−103.484	43.558	1292
YEL408	Yellowstone NP	WY	MST	−110.400	44.565	2430
YOS404	Yosemite NP	CA	PST	−119.706	37.713	1605

Note: Elevated sites defined as sites with an elevation higher than 1000 m a.s.l. (above sea level). The available sites during April 2010 are listed. Time zone indicates Pacific, Mountain, Central, and Eastern Standard Time as PST, MST, CST, and EST.