Supporting Information:
Changes in ozone chemical sensitivity in the U.S. from 2007 to 2016

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Table S1. Modeled anthropogenic NO_x and VOC emissions for 2007 and 2016 simulations.

state	VOC			NOx		
	2007 (tons)	2016 (tons)	% change (2016-2007)	2007 (tons)	2016 (tons)	% change (2016-2007)
Alabama	410,008	388,485	-5.2%	419636	281698	-32.9%
Arizona	255,738	240,967	-5.8%	323376	183004	-43.4%
Arkansas	308,889	379,139	22.7%	239762	181729	-24.2%
California	1,146,194	1,322,224	15.4%	1008339	531648	-47.3%
Colorado	333,995	276,843	-17.1%	306532	223686	-27.0%
Connecticut	88,514	77,123	-12.9%	100091	54490	-45.6%
Delaware	29,192	18,735	-35.8%	48138	24112	-49.9%
District of Columbia	10,571	8,357	-20.9%	13269	7515	-43.4%
Florida	873,743	674,565	-22.8%	935493	495966	-47.0%
Georgia	636,242	529,453	-16.8%	642853	317161	-50.7%
Idaho	615,961	378,552	-38.5%	99071	89296	-9.9%
Illinois	460,970	380,843	-17.4%	694161	377208	-45.7%
Indiana	327,805	267,135	-18.5%	563814	331265	-41.2%
Iowa	179,029	200,907	12.2%	279672	180458	-35.5%
Kansas	278,501	290,110	4.2%	321857	240720	-25.2%
Kentucky	230,957	347,315	50.4%	417682	237296	-43.2%
Louisiana	481,043	724,381	50.6%	543347	348429	-35.9%
Maine	79,529	56,771	-28.6%	74939	45785	-38.9%
Maryland	158,045	112,581	-28.8%	240267	119404	-50.3%
Massachusetts	172,631	138,330	-19.9%	179821	116785	-35.1%
Michigan	503,108	370,754	-26.3%	606407	327744	-46.0%
Minnesota	397,625	572,937	44.1%	435225	234023	-46.2%
Mississippi	255,017	211,462	-17.1%	263627	150342	-43.0%
Missouri	354,001	472,624	33.5%	478210	323218	-32.4%
Montana	350,865	212,660	-39.4%	155666	105102	-32.5%
Nebraska	102,386	96,488	-5.8%	234450	158917	-32.2%
Nevada	124,489	85,794	-31.1%	110055	71136	-35.4%
New Hampshire	55,397	39,178	-29.3%	54087	33386	-38.3%
New Jersey	238,943	160,792	-32.7%	270176	136539	-49.5%
New Mexico	183,200	302,826	65.3%	220065	179884	-18.3%
New York	503,981	386,431	-23.3%	488560	282666	-42.1%
North Carolina	530,243	540,017	1.8%	470671	274418	-41.7%
North Dakota	55,742	531,851	854.1%	158412	158627	0.1%
Ohio	444,929	373,759	-16.0%	771219	361919	-53.1%
Oklahoma	496,050	572,874	15.5%	426475	324256	-24.0%
Oregon	409,074	468,012	14.4%	186806	127172	-31.9%
Pennsylvania	435,528	513,199	17.8%	642934	409785	-36.3%
Rhode Island	25,122	21,982	-12.5%	22780	21849	-4.1%

South Carolina	271,968	228,420	-16.0%	259348	162372	-37.4%
South Dakota	76,243	141,167	85.2%	76331	54238	-28.9%
Tennessee	313,919	363,226	15.7%	455825	249996	-45.2%
Texas	2,367,214	1,946,787	-17.8%	1651844	1114117	-32.6%
Utah	241,181	211,955	-12.1%	218065	145529	-33.3%
Vermont	29,224	26,846	-8.1%	22380	14043	-37.3%
Virginia	336,864	291,636	-13.4%	408377	238065	-41.7%
Washington	451,071	374,690	-16.9%	341231	217652	-36.2%
West Virginia	105,294	240,617	128.5%	283523	164021	-42.1%
Wisconsin	326,001	229,453	-29.6%	314846	206884	-34.3%
Wyoming	255,149	437,101	71.3%	243837	155264	-36.3%
National	17,317,384	17,240,984	-0.4%	17723555	10832402	-38.9%

Table S2: Chemical regime determinations based on differences in May-Sep weekend and weekday MDA8 O_3 values. "NO_x Lim" (NO_x-limited) or "NO_x Sat" (NO_x-saturated) categorization indicate Welch's t test p-values for mean WE-WD differences of less than 0.05. Double asterisks (**) indicate p-values less than 0.01. Italics indicate different categorization between the measured and modeled values. Bold indicates different signs for the measured and modeled WE-WD differences.

Region	Area	Weekend – Weekday Differences (ppb)							
		2007				2016			
		Measured		Modeled		Measured		Modeled	
		mean	category	mean	category	mean	category	mean	category
Northeast	Baltimore	_-5.3**_	_NO_x Lim_	_-2.3_	_Mixed_	-6.9**	NO_x Lim	-5.2**	NO_x Lim
	Greater Connecticut	_-7.2**_	_NO_x Lim_	_-1.7_	_Mixed_	-6.2**	NO_x Lim	-3.5	NO_x Lim
	New York	_-3.3**_	_NO_x Lim_	_1.0_	_Mixed_	-4.6**	NO_x Lim	-2.2**	NO_x Lim
	Philadelphia	_-4.1**_	_NO_x Lim_	_-0.3_	_Mixed_	-5.0**	NO_x Lim	-3.7**	NO_x Lim
	Washington	_-4.8**_	_NO_x Lim_	_-1.4_	_Mixed_	-5.3**	NO_x Lim	-3.9**	NO_x Lim
Southeast	Atlanta	-1.6	Mixed	0.3	Mixed	-5.8**	NO_x Lim	-4.9**	NO_x Lim
Ohio Valley	Chicago	**_-0.5_**	**_Mixed_**	**_2.6**_**	**_NO_x Sat_**	-1.8**	NO_x Lim	-1.9**	NO_x Lim
	Cincinnati	0.1	Mixed	-0.8	Mixed	-0.3	Mixed	-0.4	Mixed
	Cleveland	-7.7**	NO_x Lim	-4.6**	NO_x Lim	_-4.3**_	_NO_x Lim_	_-1.7_	_Mixed_
	Columbus	-5.5**	NO_x Lim	-4.2**	NO_x Lim	_-3.8**_	_NO_x Lim_	_-1.5_	_Mixed_
	Louisville	-0.4	Mixed	1.4	Mixed	-0.5	Mixed	-0.9	Mixed
	St. Louis	**_-1.4_**	**_Mixed_**	**_4.6**_**	**_NO_x Sat_**	_-2.1_	_NO_x Lim_	_-0.7_	_Mixed_
Upper Midwest	Allegan Co, MI	-4.7	Mixed	-1.6	Mixed	-6.1	NO_x Lim	-5.8	NO_x Lim
	Berrien Co, MI	-4.6	Mixed	-2.6	Mixed	-5.2	Mixed	-5.5	Mixed
	Detroit	_-5.8**_	_NO_x Lim_	_-1.3_	_Mixed_	-3.2**	NO_x Lim	-3.7**	NO_x Lim
	Door Co, WI	-2.9	Mixed	-1.9	Mixed	-1.0	Mixed	-0.1	Mixed
	Manitowoc Co, WI	-1.3	Mixed	0.4	Mixed	-2.1	Mixed	-3.1	Mixed
	Muskegon Co, WI	-6.2	Mixed	-1.1	Mixed	-3.9	Mixed	-4.3	Mixed
	Northern Milwaukee	0.1	Mixed	2.1	Mixed	-2.6	Mixed	-2.5	Mixed
	Sheboygan Co, WI	-1.9	Mixed	0.7	Mixed	-2.7	Mixed	-3.2	Mixed
South	Dallas	**_-2.2_**	**_NO_x Lim_**	**_5.0**_**	**_NO_x Sat_**	-3.1**	NO_x Lim	-2.1**	NO_x Lim
	Houston	2.4	NOx Sat	6.4**	NO_x Sat	-2.3**	NO_x Lim	-7.1**	NO_x Lim
	San Antonio	1.8	Mixed	2.0	Mixed	-3.1	NO_x Lim	-5.2**	NO_x Lim
Southwest	Denver	2.2	NO_x Sat	6.1	NO_x Sat	-1.2	Mixed	-0.5	Mixed
	Dona Ana Co, NM	_1.7_	_Mixed_	_3.3_	_NO_x Sat_	_2.3_	_Mixed_	_2.8_	_NO_x Sat_
	Northern Wasatch Front	1.7	NO_x Sat	3.1**	NO_x Sat	_-0.4_	_Mixed_	_-1.6_	_NO_x Lim_

	Phoenix	-2.6**	NO_x Lim	-1.5	NO_x Lim	*-1.1***	*NO_x Lim*	*-0.2*	*Mixed*
	Southern Wasatch Front	*0.3*	*Mixed*	*2.6*	*NO_x Sat*	-1.2	Mixed	-1.3	Mixed
	Amador Co, CA	-5.6	NO_x Lim	-5.0	NO_x Lim	-2.9	Mixed	-3.6	Mixed
	Butte Co, CA	*-6.5*	*NO_x Lim*	*-4.7*	*Mixed*	-5.1**	NO_x Lim	-5.5**	NO_x Lim
	Calaveras Co, CA	*-5.2*	*NO_x Lim*	*-4.2*	*Mixed*	-2.9	Mixed	-3.3	Mixed
	Imperial Co, CA	*-2.3*	*Mixed*	*-3.4***	*NO_x Lim*	-5.1**	NO_x Lim	-6.0**	NO_x Lim
	Kern	0.7	Mixed	-2.3	Mixed	-3.8	Mixed	-2.0	Mixed
	Las Vegas	0.3	Mixed	-0.4	Mixed	-1.2	Mixed	0.4	Mixed
	Los Angeles	11.4**	NO_x Sat	12.2**	NO_x Sat	***-1.8***	***NOx Lim***	***1.3***	***Mixed***
	Mariposa Co, CA	0.1	Mixed	-0.9	Mixed	-1.1	Mixed	-1.2	Mixed
	Morongo Band of Mission Indians	1.0	Mixed	4.1	Mixed	-9.4**	NO_x Lim	-5.8**	NO_x Lim
	Nevada Co, CA	-4.7	NO_x Lim	-3.9	NO_x Lim	*-5.3*	*Mixed*	*-5.9*	*NO_x Lim*
West	**Riverside**	-0.6	Mixed	0.0	Mixed	-6.8**	NO_x Lim	-4.2**	NO_x Lim
	Sacramento	-4.8**	NO_x Lim	-3.6**	NO_x Lim	-2.4**	NO_x Lim	-3.4**	NO_x Lim
	San Bernardino	*1.9*	*Mixed*	*2.1*	NO_x Sat	-6.3**	NO_x Lim	-4.2**	NO_x Lim
	San Diego	4.1**	NO_x Sat	3.2**	NO_x Sat	-0.8	Mixed	1.5	Mixed
	San Francisco	-1.7**	NO_x Lim	-3.7**	NO_x Lim	2.1**	NO_x Sat	2.6**	NO_x Sat
	San Joaquin Valley	-3.1**	NO_x Lim	-3.2**	NO_x Lim	-2.5**	NO_x Lim	-2.5**	NO_x Lim
	San Luis Obispo	-4.4	NO_x Lim	-2.8	NO_x Lim	-2.6	Mixed	-1.0	Mixed
	Sutter Buttes	-6.6**	NO_x Lim	-4.7	NO_x Lim	*-3.8*	*Mixed*	*-4.7*	*NO_x Lim*
	Tuolumne Co, CA	-3.6	Mixed	-2.8	Mixed	-1.6	Mixed	-2.2	Mixed
	Tuscan Buttes	-6.2	NO_x Lim	-5.0	NO_x Lim	-5.9	NO_x Lim	-4.5	NO_x Lim
	Ventura Co, CA	*3.8***	*NO_x Sat*	*0.4*	*Mixed*	-3.6**	NO_x Lim	-3.6**	NO_x Lim

Table S3: Chemical regime determinations based on differences in May-Sep weekend and weekday MDA8 O_3 values at the monitor with the highest 2016 O_3 design value in each nonattainment area. NOx Lim or NOx Sat categorization indicate t test p-values for mean WE-WD differences of less than 0.05. Double asterisks (**) indicate p-values less than 0.01.

region	**Site number**	**area**	**Weekend – Weekday Differences (ppb)**							
			2007				**2016**			
			Measured		**Measured**		**Measured**		**Measured**	
			mean	**mean**	**mean**	**mean**	**mean**	**mean**	**mean**	**mean**
Northeast	**240251001**	**Baltimore**	-5.7	mixed	-1.5	mixed	-6.8	Nox Lim	-6.3	mixed
	90110124	**Greater Connecticut**	-4.3	mixed	2.1	mixed	-5.8	mixed	-5.7	mixed
	90019003	**New York**	-4.1	mixed	-0.3	mixed	-6.5	mixed	-2.3	mixed
	421010024	**Philadelphia**	-4.6	mixed	2.7	mixed	-4.6	mixed	-1.7	mixed
	240338003	**Washington**	-5.6	mixed	-4.1	mixed	-5.5	Nox Lim	-5.1	mixed
Southeast	**131210055**	**Atlanta**	-1.5	mixed	2.9	mixed	-5.8	mixed	-4.0	mixed
Ohio Valley	**550590019**	**Chicago**	0.0	mixed	2.5	mixed	-3.9	mixed	-2.5	mixed
	390610006	**Cincinnati**	1.0	mixed	0.2	mixed	0.3	mixed	0.6	mixed
	390850003	**Cleveland**	-8.9**	Nox Lim	-1.3	mixed	-5.5	mixed	-1.2	mixed
	390490029	**Columbus**	-7.5	Nox Lim	-4.2	mixed	-4.5	Nox Lim	-1.8	mixed
	180190008	**Louisville**	-2.9	mixed	-1.2	mixed	-2.0	mixed	-1.8	mixed
	180431004	**Louisville**	-0.1	mixed	1.7	mixed	-1.2	mixed	-2.3	mixed
	291831002	**St. Louis**	-3.7	mixed	4.0	mixed	-3.2	mixed	-1.5	mixed
Upper Midwest	**260050003**	**Allegan Co, MI**	-4.7	mixed	-1.6	mixed	-6.1	Nox Lim	-5.8	Nox Lim
	260210014	**Berrien Co, MI**	-4.6	mixed	-2.6	mixed	-5.2	mixed	-5.5	mixed
	261630019	**Detroit**	-6.9	mixed	1.3	mixed	-4.8	mixed	-2.9	mixed
	550290004	**Door Co, WI**	-2.9	mixed	-1.9	mixed	-1.0	mixed	-0.1	mixed
	550710007	**Manitowoc Co, WI**	-1.3	mixed	0.4	mixed	-2.1	mixed	-3.1	mixed
	261210039	**Muskegon Co, MI**	-6.2	mixed	-1.1	mixed	-3.9	mixed	-4.3	mixed
	550890009	**Northern Milwaukee**	-0.3	mixed	1.0	mixed	-2.5	mixed	-3.5	mixed
	551170006	**Sheboygan Co, MI**	-1.9	mixed	0.7	mixed	-2.7	mixed	-3.2	mixed
South	**482010024**	**Houston**	1.4	mixed	6.7	mixed	-3.2	mixed	-7.1	Nox Lim
	480290032	**San Antonio**	2.7	mixed	3.7	mixed	-3.1	mixed	-5.1	mixed

	481210034	**Dallas**	-4.8	mixed	5.3	mixed	-5.1	mixed	-3.7	mixed
Southwest	**80590011**	**Denver**	1.6	mixed	7.6	Nox Sat	-2.0	mixed	0.6	mixed
	350130022	**Dona Ana Co, NM**	1.8	mixed	2.1	mixed	2.2	mixed	2.4	mixed
	350130021	**Dona Ana Co, NM**	1.6	mixed	3.9	mixed	2.3	mixed	3.2	mixed
	490353006	**Northern Wasatch Front, UT**	3.2	mixed	4.0	mixed	1.1	mixed	-1.3	mixed
	40132005	**Phoenix**	-5.1	Nox Lim	-2.3	mixed	-1.9	mixed	-3.1	mixed
	40139997	**Phoenix**	-0.3	mixed	3.1	mixed	-1.4	mixed	1.7	mixed
	490490002	**Southern Wasatch Front, UT**	1.4	mixed	2.7	mixed	-0.2	mixed	-0.9	mixed
	490471002	**Uinta Basin, UT**	-1.5	mixed	1.5	mixed	0.1	mixed	-0.3	mixed
West	**60050002**	**Amador Co, CA**	-5.6	Nox Lim	-5.0	Nox Lim	-2.9	mixed	-3.6	mixed
	60070007	**Butte Co, CA**	-6.5	Nox Lim	-4.7	mixed	-6.0	Nox Lim	-5.7	Nox Lim
	60090001	**Calaveras Co, CA**	-5.2	Nox Lim	-4.2	mixed	-2.9	mixed	-3.3	mixed
	60250005	**Imperial Co, CA**	-1.6	mixed	-4.6	mixed	-3.2	mixed	-5.8	Nox Lim
	60290011	**Kern Co, CA**	0.7	mixed	-2.3	mixed	-3.8	mixed	-2.0	mixed
	320030075	**Las Vegas**	0.5	mixed	-1.1	mixed	-2.2	mixed	-0.6	mixed
	60658001	**Los Angeles**	9.0**	Nox Sat	16.4**	Nox Sat	-3.4	mixed	1.4	mixed
	60376012	**Los Angeles**	8.9	Nox Sat	6.0	mixed	-7.1	Nox Lim	-4.1	mixed
	60430003	**Mariposa Co, CA**	-1.6	mixed	-1.4	mixed	0.1	mixed	-0.4	mixed
	60650012	**Morongo Band of Mission Indians**	0.1	mixed	5.2	Nox Sat	-10.7**	Nox Lim	-5.7	Nox Lim
	60570005	**Nevada Co, CA**	-5.7	mixed	-3.9	mixed	-5.3	mixed	-5.9	Nox Lim
	60655001	**Riverside Co, CA**	2.2	mixed	0.1	mixed	-9.5**	Nox Lim	-5.5	Nox Lim
	60170010	**Sacramento**	-5.5	mixed	-4.1	mixed	-5.3	mixed	-4.7	mixed
	60731006	**San Diego Co, CA**	4.1	mixed	-0.6	mixed	-4.3	mixed	-1.2	mixed
	60010007	**San Francisco Bay Area**	-1.9	mixed	-4.0	mixed	0.8	mixed	3.7	mixed
	60194001	**San Joaquin Valley**	-2.3	mixed	-4.3	mixed	-6.5	Nox Lim	-4.3	mixed
	60798005	**San Luis Obispo**	-4.7	mixed	-2.7	mixed	-2.2	mixed	-1.4	mixed
	61010004	**Sutter Buttes**	-6.6	Nox Lim	-4.7	Nox Lim	-3.8	mixed	-4.7	Nox Lim
	61090005	**Tuolumne Co, CA**	-3.6	mixed	-2.8	mixed	-1.6	mixed	-2.2	mixed
	61030004	**Tuscan Buttes, CA**	-6.2	Nox Lim	-5.0	Nox Lim	-5.9	Nox Lim	-4.5	Nox Lim
	61112002	**Ventura Co, CA**	6.8	Nox Sat	0.8	mixed	-5.2	Nox Lim	-4.7	mixed

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Table S4. Ypsilanti monitor MDA8 from the top 9 high days modeled in the 2007 simulation, these same days projected to 2016 values using the 2007 HDDM sensitivities and assuming 2016 emission levels (0.55 NO_x and 0.75 VOC of 2007 emissions), and the top 9 high days modeled in the 2016 simulation. Averages across each set of 9 days are shown in bold italics in the bottom row.

Modeled 2007	**Projected 2016**	**Modeled 2016**
79.68	73.01	77.14
79.43	71.81	71.92
79.21	79.67	71.13
77.72	69.15	65.65
75.43	65.54	63.67
72.64	73.39	63.19
72.63	70.90	62.38
70.55	65.32	62.03
70.05	71.68	61.61
75.26	***71.16***	***66.52***

Monte Carlo DOW Analysis Testing

To investigate the sensitivity of our DOW analysis results to the observations used, we performed Monte Carlo analyses for four of the most populated non-attainment areas in our study: Atlanta, Chicago, Houston, and Los Angeles. For each area, 1000 Monte Carlo simulations were performed. For each case, weekday values were randomly sampled without replacement and the Welch's t-test comparison was re-run for the weekend vs. re-sampled weekday values. This was repeated 100 times and the distributions of p-values and WE-WD differences were recorded. Blue stars indicate values from the original analysis that includes all weekday data.

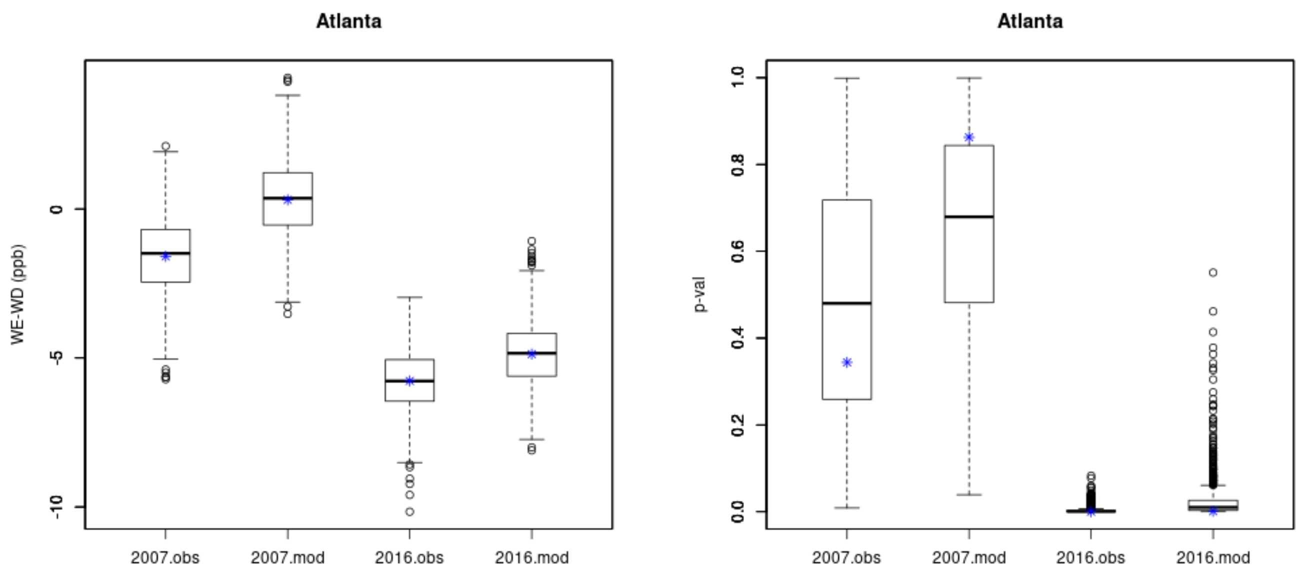


Figure S1. Monte Carlo results to randomize observations selected in DOW analysis – Atlanta. For 2007, both the modeled and observed distributions have insignificant p-values and ranges of WE-WD differences that cross 0. For 2016, both the modeled and observed distributions have consistently negative WE-WD differences and mostly significant p-values (there are some outlier insignificant p-values in the modeled dataset).

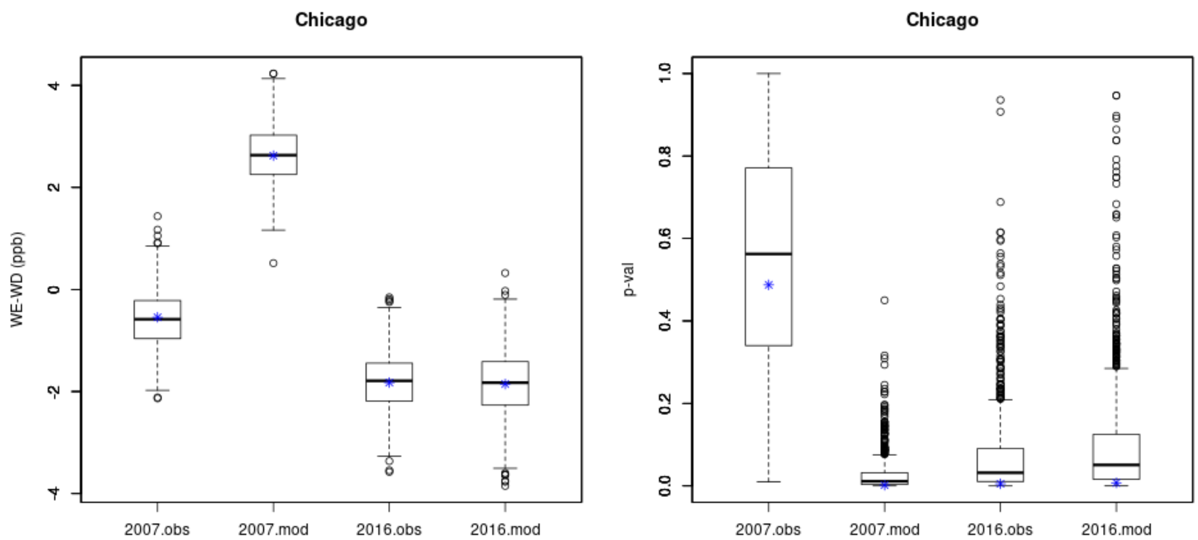


Figure S2. Monte Carlo results to randomize observations selected in DOW analysis – Chicago. For 2007, the observations have insignificant p-values and ranges of WE-WD differences that cross 0. Modeled values for 2007 have mostly significant p-values and consistently positive WE-WD differences. In 2016, both the modeled and observed values have consistently negative WE-WD differences and generally significant p-values, although the non-outlier range for the p-values goes up to 0.2 for the observations and 0.3 for the model.

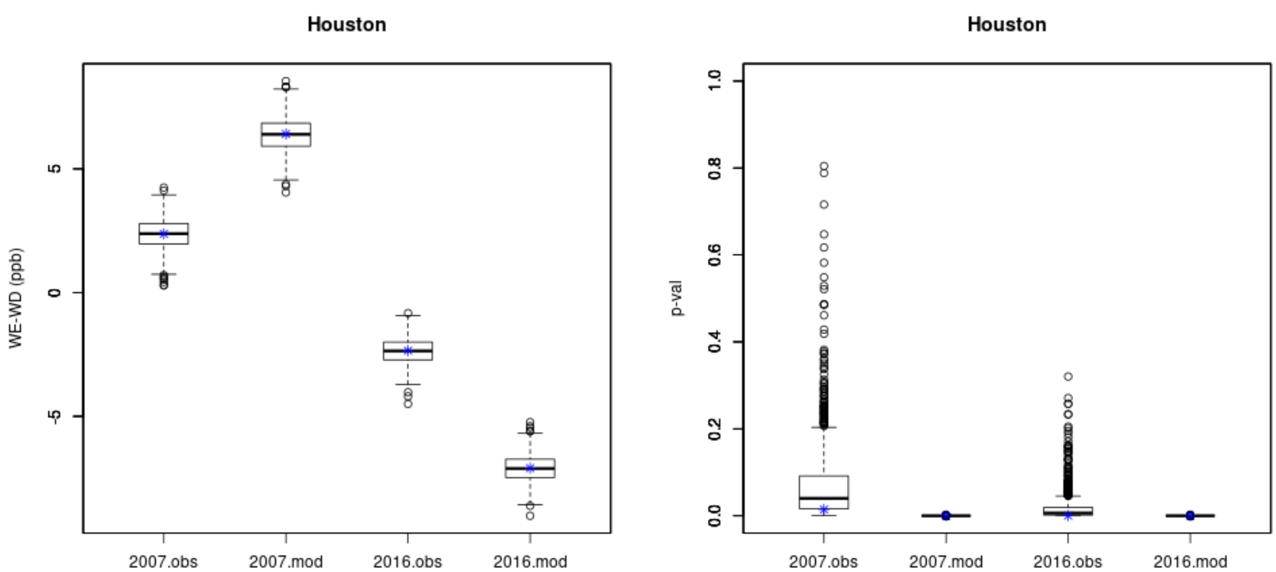


Figure S3. Monte Carlo results to randomize observations selected in DOW analysis – Houston. In 2007, both the modeled and observed distributions have generally significant p-values and positive WE-WD differences. Observed p-values have a wider range and WE-WD differences are less positive. In 2016, both the modeled and observed distributions have consistently negative WE-WD differences and mostly significant p-values (there are some insignificant outlier p-values in the 2016 observational dataset).

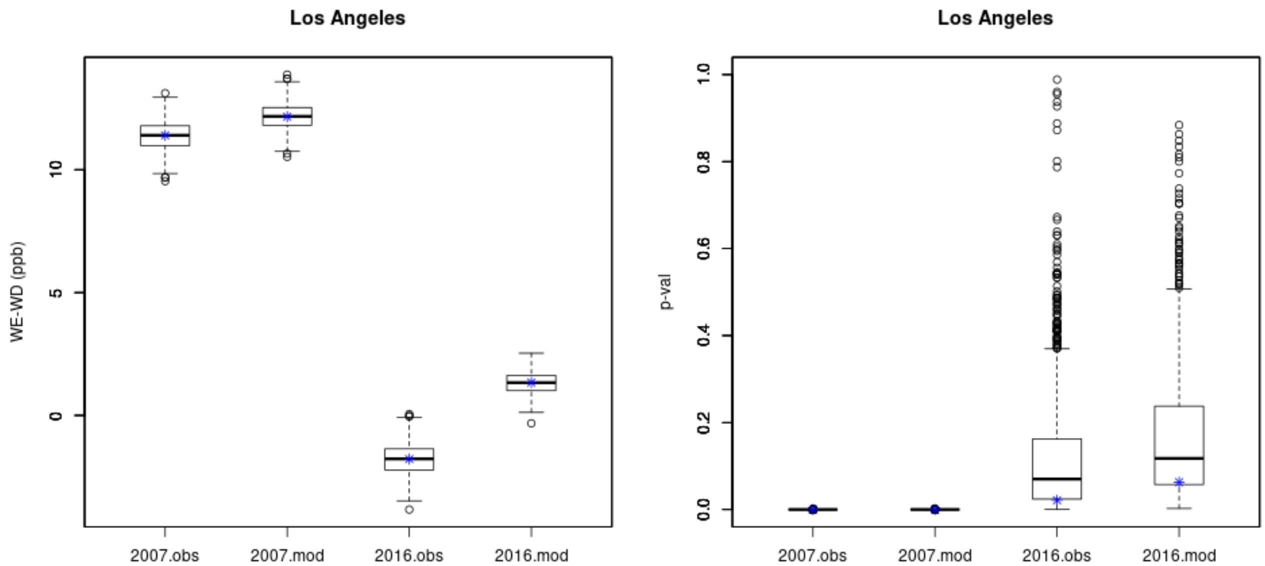


Figure S4. Monte Carlo results to randomize observations selected in DOW analysis – Los Angeles. In 2007, both the modeled and observed distributions have significant p-values and consistently positive WE-WD differences. In 2016, both the modeled and observed distributions have ranges of WE-WD differences that cross 0 and mostly insignificant p-values (original 2016 observational p-value was less than 0.05 but above 0.01).

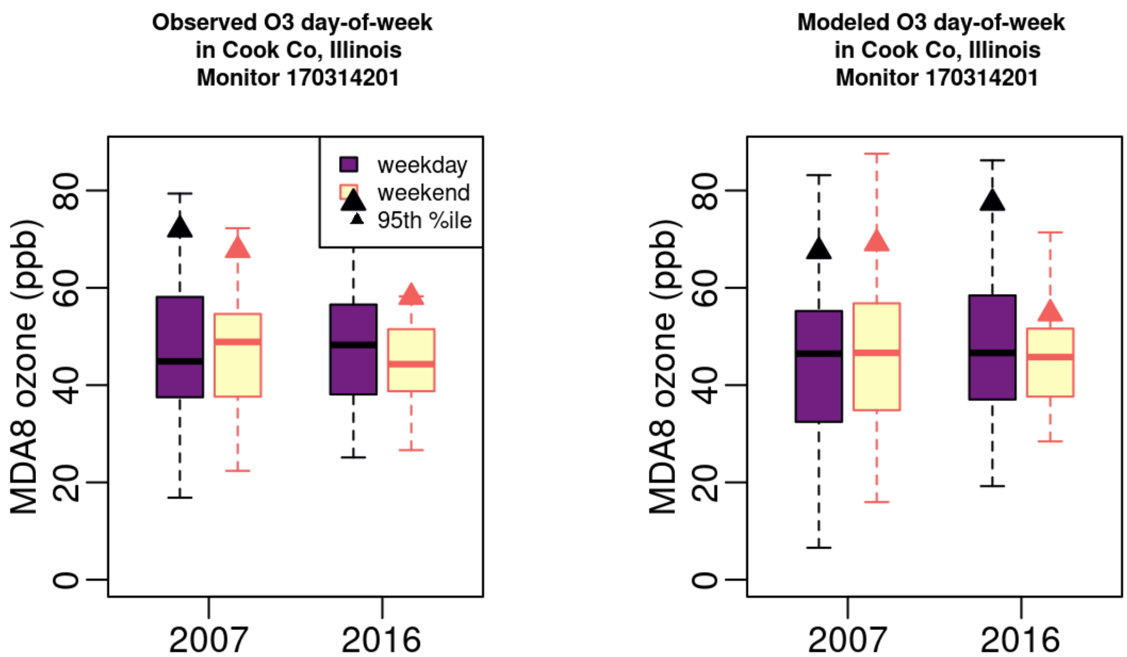


Figure S5. May-September weekday versus weekend MDA8 O3 at the Northbrook, IL monitor (170314201) for 2007 and 2016 based on monitored values (left panel) and modeled values in grid cells containing monitor location (right panel). Boxes represent the 25th-75th percentile, horizontal lines represent median values, whiskers extend to 1.5 × the interquartile range, dots show outlier values and triangles represent 95th percentile values. Boxplot pairs that have statistically different distributions on weekends versus weekdays are outlined in bold.

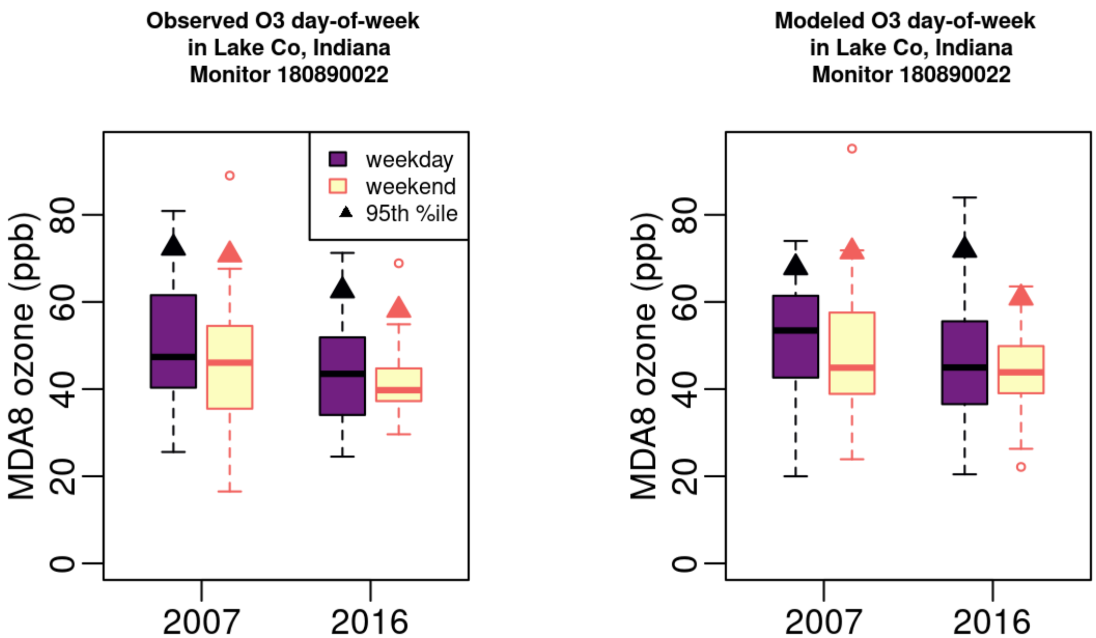


Figure S6. May-September weekday versus weekend MDA8 O3 at the Gary, IN monitor (180890022) for 2007 and 2016 based on monitored values (left panel) and modeled values in grid cells containing monitor location (right panel). Boxes represent the 25th-75th percentile, horizontal lines represent median values, whiskers extend to 1.5 × the interquartile range, dots show outlier values and triangles represent 95th percentile values. Boxplot pairs that have statistically different distributions on weekends versus weekdays are outlined in bold.

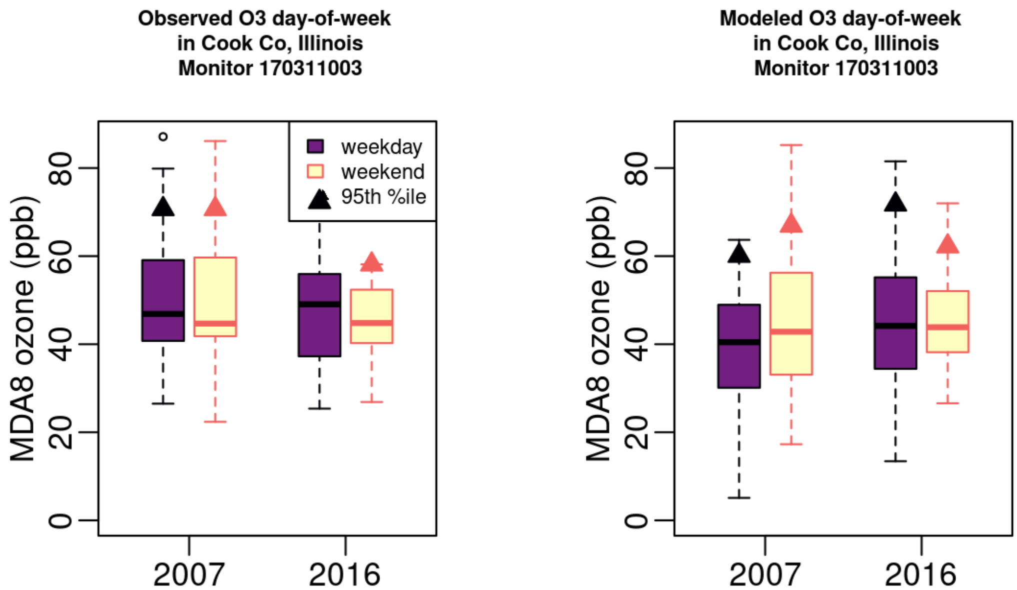


Figure S7. May-September weekday versus weekend MDA8 O3 concentrations at the monitor located southeast of O'Hare International airport (170311003) for 2007 and 2016 based on monitored values (left panel) and modeled values in grid cells containing monitor location (right panel). Boxes represent the 25th-75th percentile, horizontal lines represent median values, whiskers extend to 1.5 × the interquartile range, dots show outlier values and triangles represent 95th percentile values. Boxplot pairs that have statistically different distributions on weekends versus weekdays are outlined in bold.

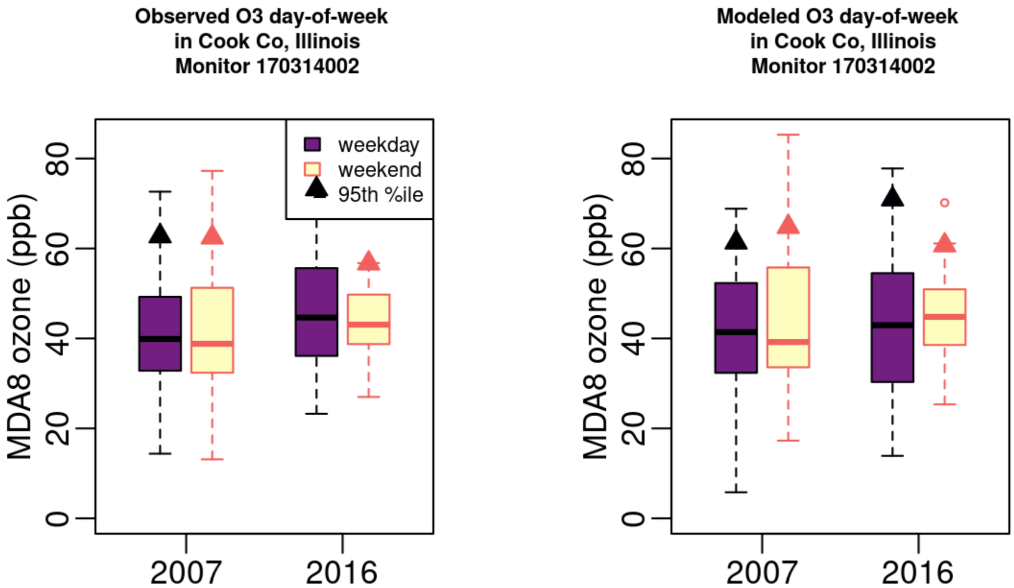


Figure S8. May-September weekday versus weekend MDA8 O3 at the Cicero, IL monitor (170314002) for 2007 and 2016 based on monitored values (left panel) and modeled values in grid cells containing monitor location (right panel). Boxes represent the 25th-75th percentile, horizontal lines represent median values, whiskers extend to 1.5 × the interquartile range, dots show outlier values and triangles represent 95th percentile values. Boxplot pairs that have statistically different distributions on weekends versus weekdays are outlined in bold.

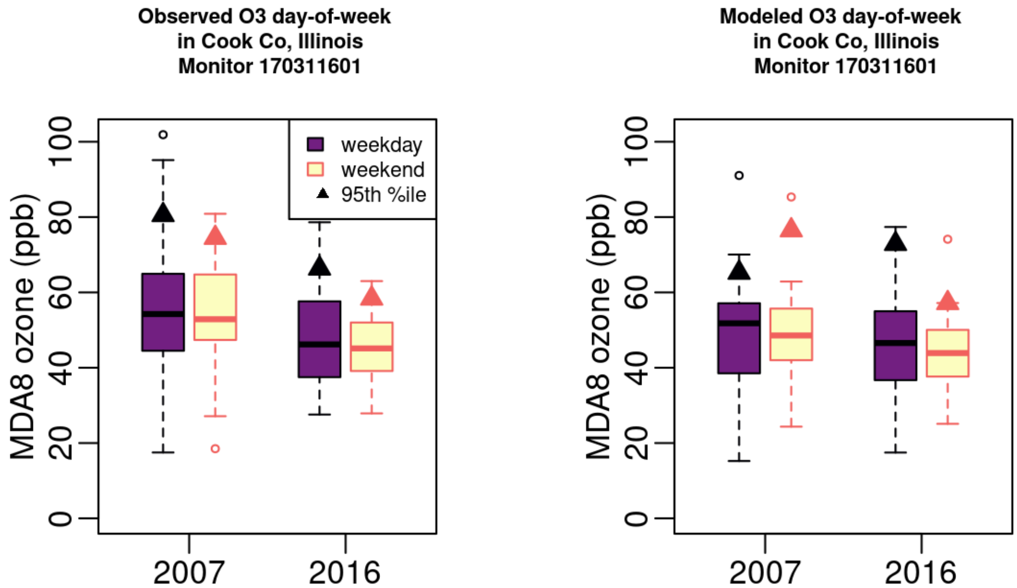


Figure S9. May-September weekday versus weekend MDA8 O3 at the Lemont, IL monitor (170311601) for 2007 and 2016 based on monitored values (left panel) and modeled values in grid cells containing monitor location (right panel). Boxes represent the 25th-75th percentile, horizontal lines represent median values, whiskers extend to 1.5 × the interquartile range, dots show outlier values and triangles represent 95th percentile values. Boxplot pairs that have statistically different distributions on weekends versus weekdays are outlined in bold.

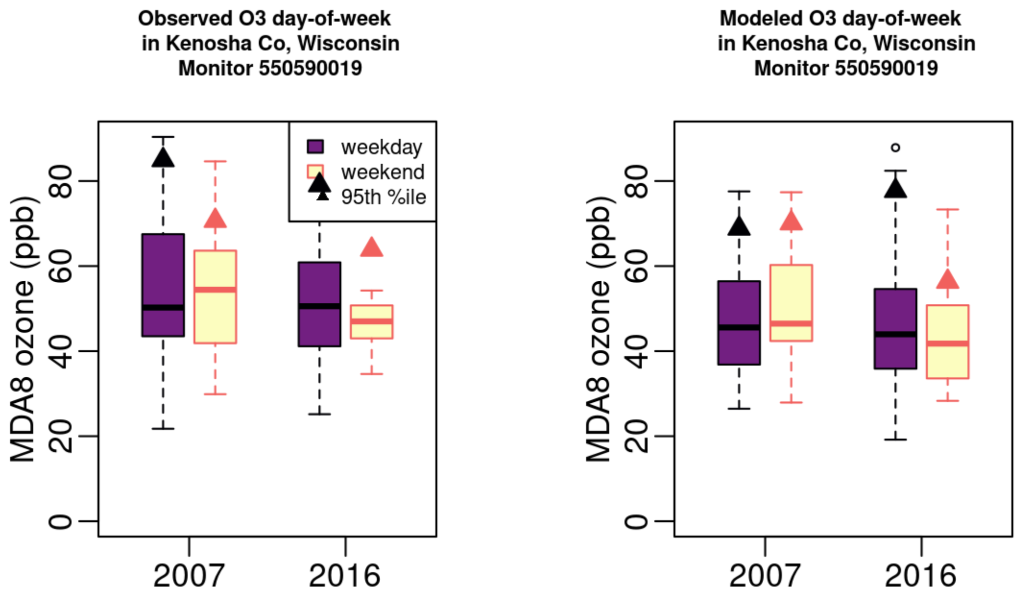


Figure S10. May-September weekday versus weekend MDA8 O3 at the Kenosha, WI monitor (550590019) for 2007 and 2016 based on monitored values (left panel) and modeled values in grid cells containing monitor location (right panel). Boxes represent the 25th-75th percentile, horizontal lines represent median values, whiskers extend to 1.5 × the interquartile range, dots show outlier values and triangles represent 95th percentile values. Boxplot pairs that have statistically different distributions on weekends versus weekdays are outlined in bold.

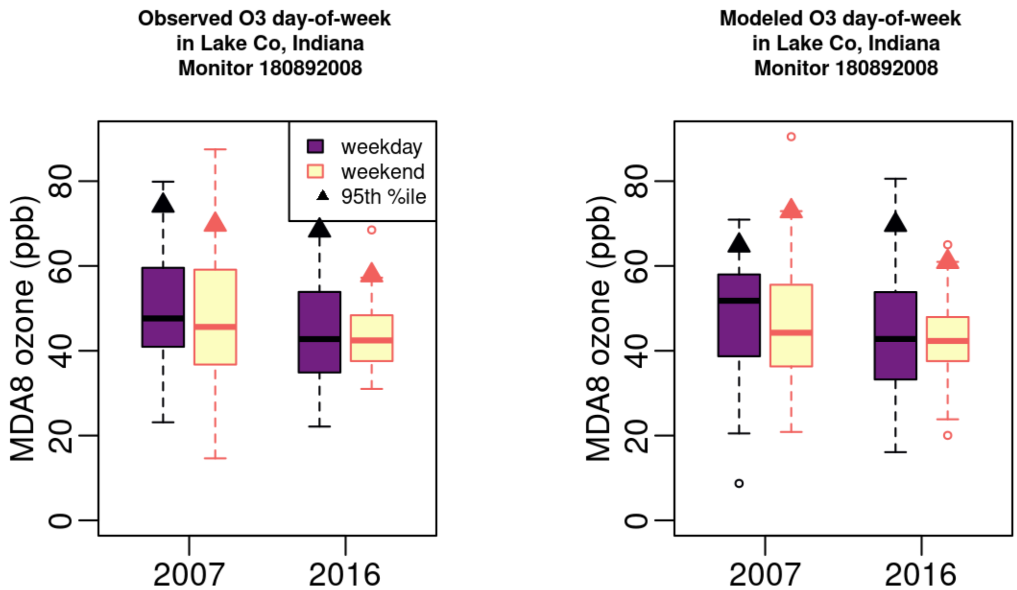


Figure S11. May-September weekday versus weekend MDA8 O3 at the Hammond, IN monitor (180892008) for 2007 and 2016 based on monitored values (left panel) and modeled values in grid cells containing monitor location (right panel). Boxes represent the 25th-75th percentile, horizontal lines represent median values, whiskers extend to 1.5 × the interquartile range, dots show outlier values and triangles represent 95th percentile values. Boxplot pairs that have statistically different distributions on weekends versus weekdays are outlined in bold.

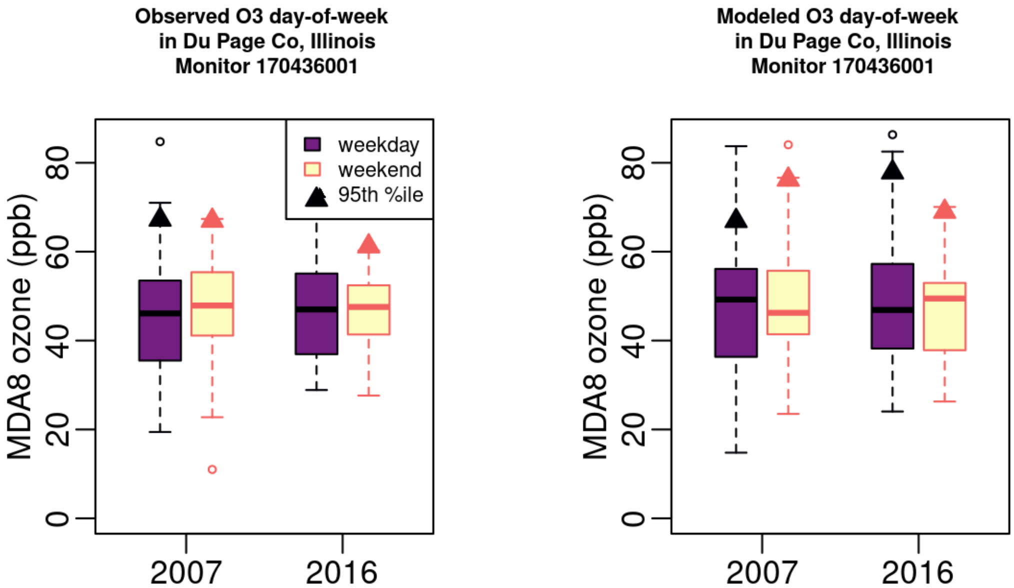


Figure S12. May-September weekday versus weekend MDA8 O3 at the Morton Arboretum monitor (170436001) for 2007 and 2016 based on monitored values (left panel) and modeled values in grid cells containing monitor location (right panel). Boxes represent the 25th-75th percentile, horizontal lines represent median values, whiskers extend to 1.5 × the interquartile range, dots show outlier values and triangles represent 95th percentile values. Boxplot pairs that have statistically different distributions on weekends versus weekdays are outlined in bold.

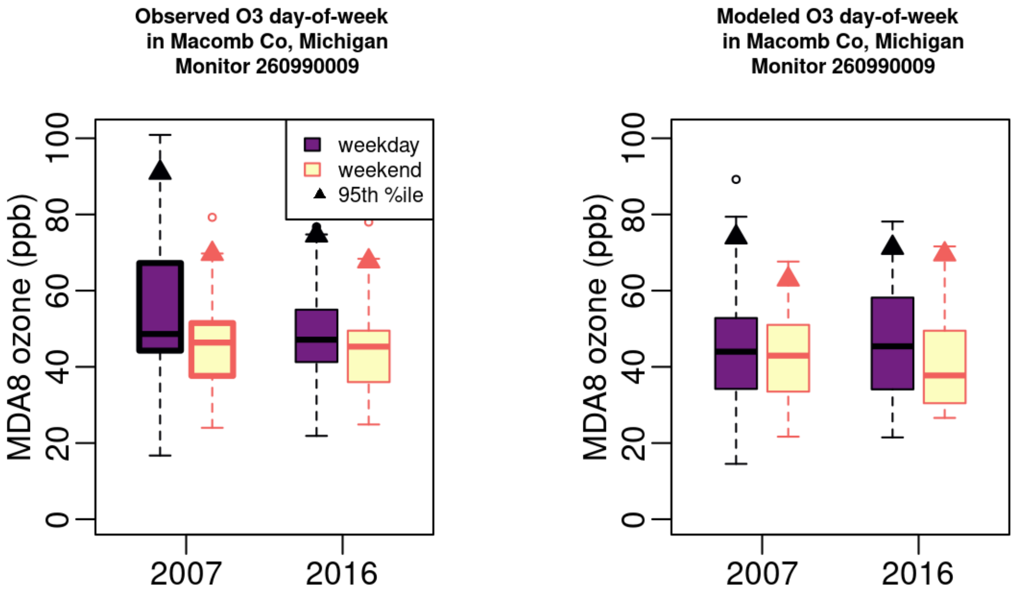


Figure S13. May-September weekday versus weekend MDA8 O3 at the New Haven monitor (260990009) for 2007 and 2016 based on monitored values (left panel) and modeled values in grid cells containing monitor location (right panel). Boxes represent the 25th-75th percentile, horizontal lines represent median values, whiskers extend to 1.5 × the interquartile range, dots show outlier values and triangles represent 95th percentile values. Boxplot pairs that have statistically different distributions on weekends versus weekdays are outlined in bold.

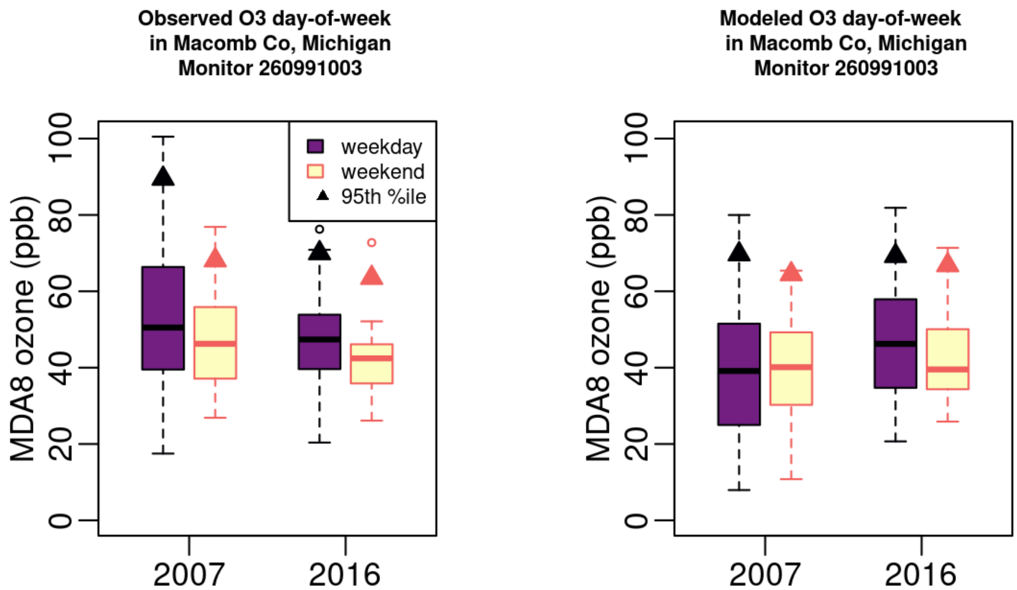


Figure S14. May-September weekday versus weekend MDA8 O3 at the Warren, MI monitor (260991003) for 2007 and 2016 based on monitored values (left panel) and modeled values in grid cells containing monitor location (right panel). Boxes represent the 25th-75th percentile, horizontal lines represent median values, whiskers extend to 1.5 × the interquartile range, dots show outlier values and triangles represent 95th percentile values. Boxplot pairs that have statistically different distributions on weekends versus weekdays are outlined in bold.

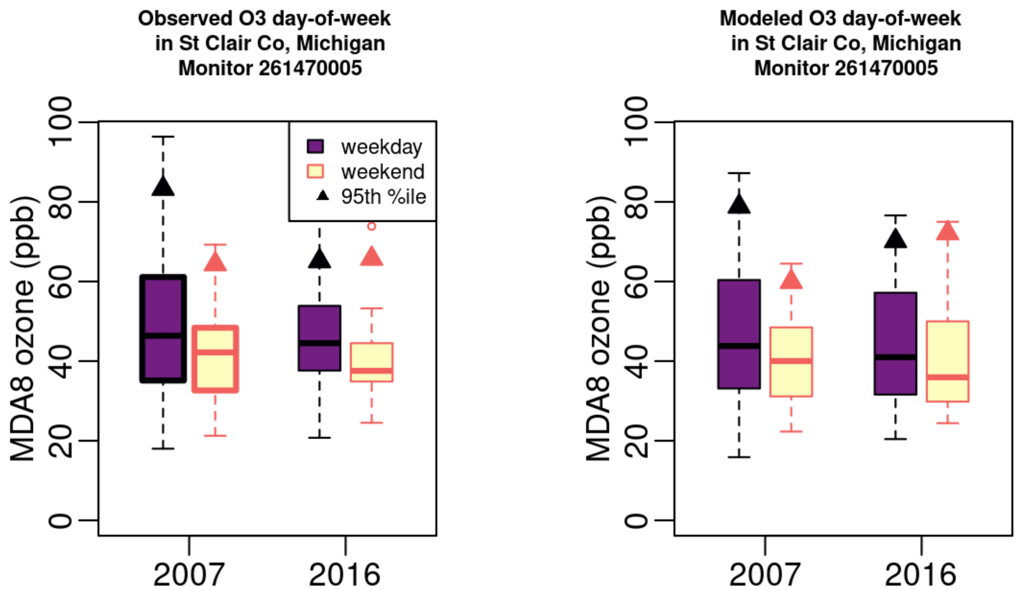


Figure S15. May-September weekday versus weekend MDA8 O3 at the Port Huron monitor (261470005) for 2007 and 2016 based on monitored values (left panel) and modeled values in grid cells containing monitor location (right panel). Boxes represent the 25th-75th percentile, horizontal lines represent median values, whiskers extend to 1.5 × the interquartile range, dots show outlier values and triangles represent 95th percentile values. Boxplot pairs that have statistically different distributions on weekends versus weekdays are outlined in bold

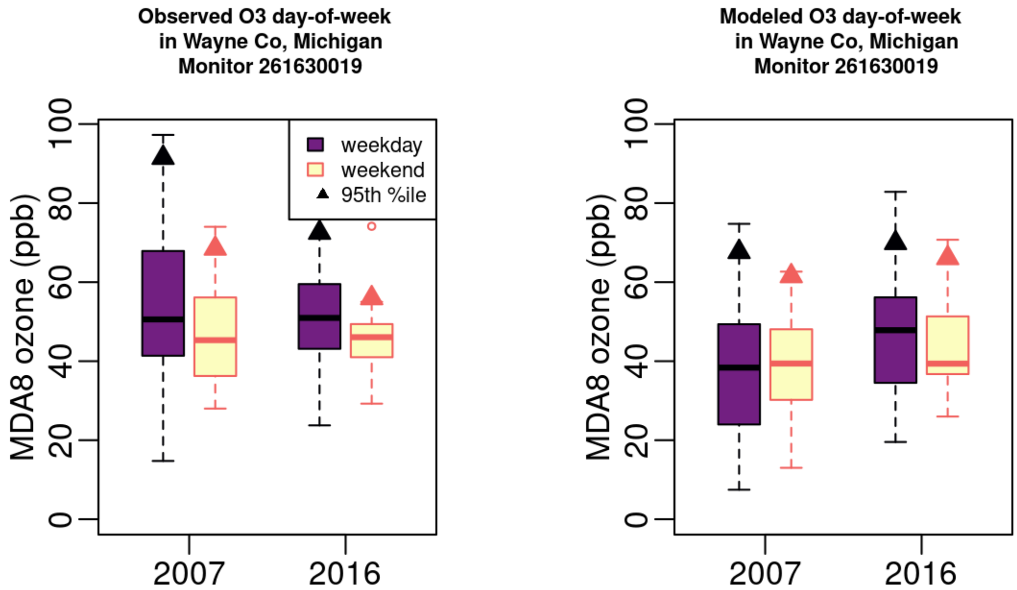


Figure S16. May-September weekday versus weekend MDA8 O3 at the East 7 Mile, MI monitor (261630019) for 2007 and 2016 based on monitored values (left panel) and modeled values in grid cells containing monitor location (right panel). Boxes represent the 25th-75th percentile, horizontal lines represent median values, whiskers extend to 1.5 × the interquartile range, dots show outlier values and triangles represent 95th percentile values. Boxplot pairs that have statistically different distributions on weekends versus weekdays are outlined in bold.

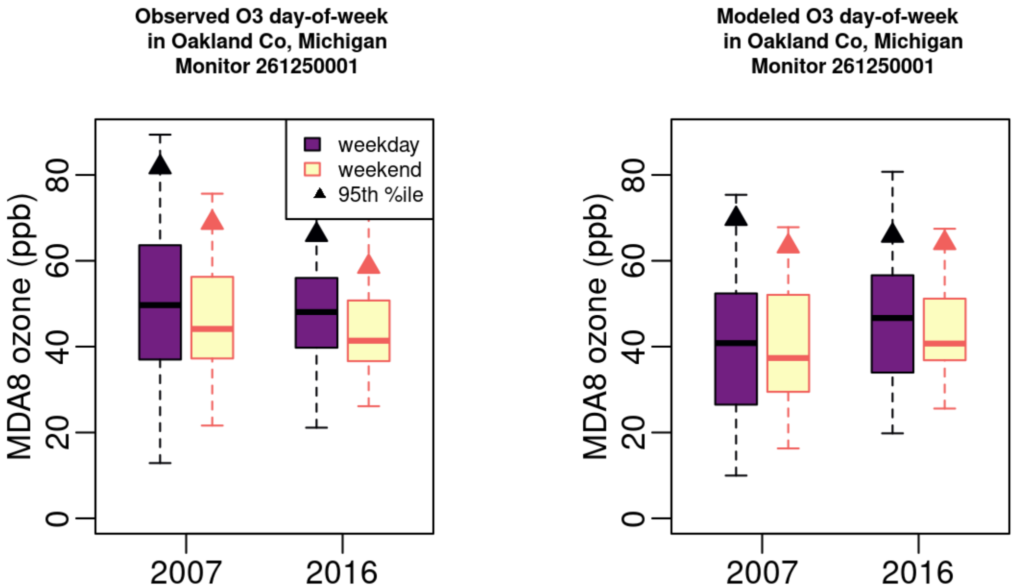


Figure S17. May-September weekday versus weekend MDA8 O3 at the Oak Park, MI monitor (261250001) for 2007 and 2016 based on monitored values (left panel) and modeled values in grid cells containing monitor location (right panel). Boxes represent the 25th-75th percentile, horizontal lines represent median values, whiskers extend to 1.5 × the interquartile range, dots show outlier values and triangles represent 95th percentile values. Boxplot pairs that have statistically different distributions on weekends versus weekdays are outlined in bold.

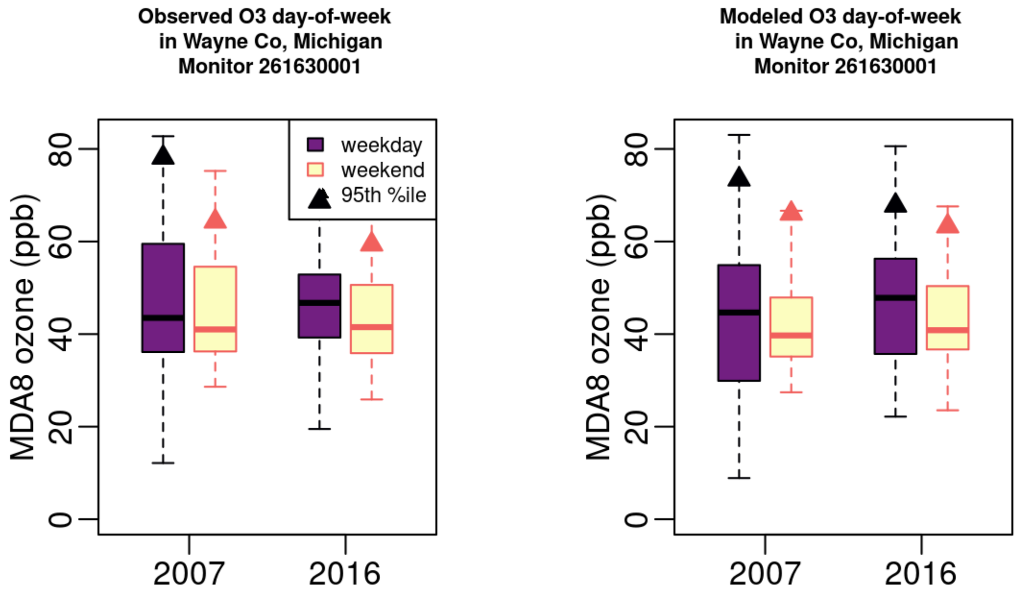


Figure S18. May-September weekday versus weekend MDA8 O3 at the Allen Park, MI monitor (261630001) for 2007 and 2016 based on monitored values (left panel) and modeled values in grid cells containing monitor location (right panel). Boxes represent the 25th-75th percentile, horizontal lines represent median values, whiskers extend to 1.5 × the interquartile range, dots show outlier values and triangles represent 95th percentile values. Boxplot pairs that have statistically different distributions on weekends versus weekdays are outlined in bold.

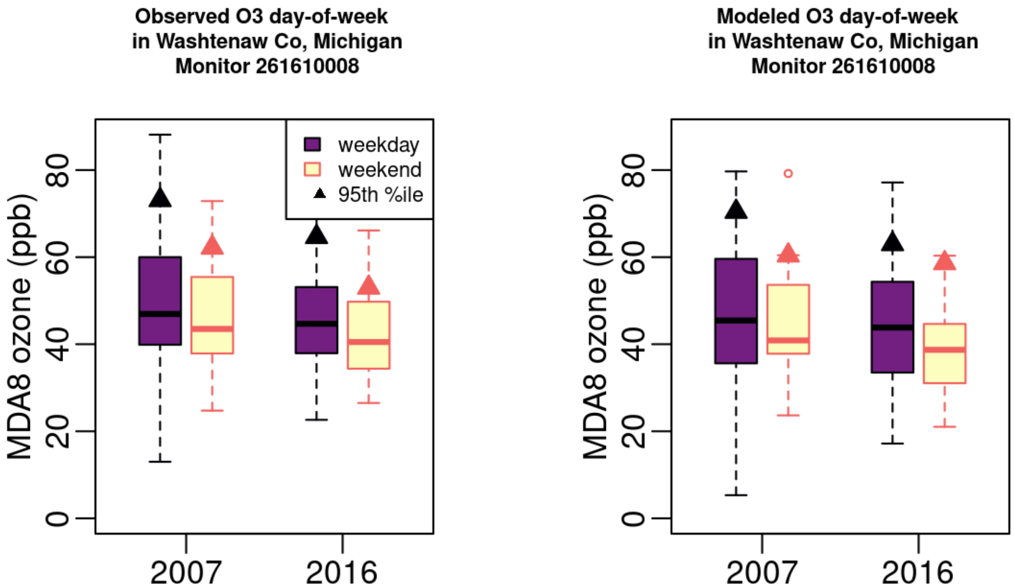


Figure S19. May-September weekday versus weekend MDA8 O3 at the Ypsilanti, MI monitor (261610008) for 2007 and 2016 based on monitored values (left panel) and modeled values in grid cells containing monitor location (right panel). Boxes represent the 25th-75th percentile, horizontal lines represent median values, whiskers extend to 1.5 × the interquartile range, dots show outlier values and triangles represent 95th percentile values. Boxplot pairs that have statistically different distributions on weekends versus weekdays are outlined in bold.

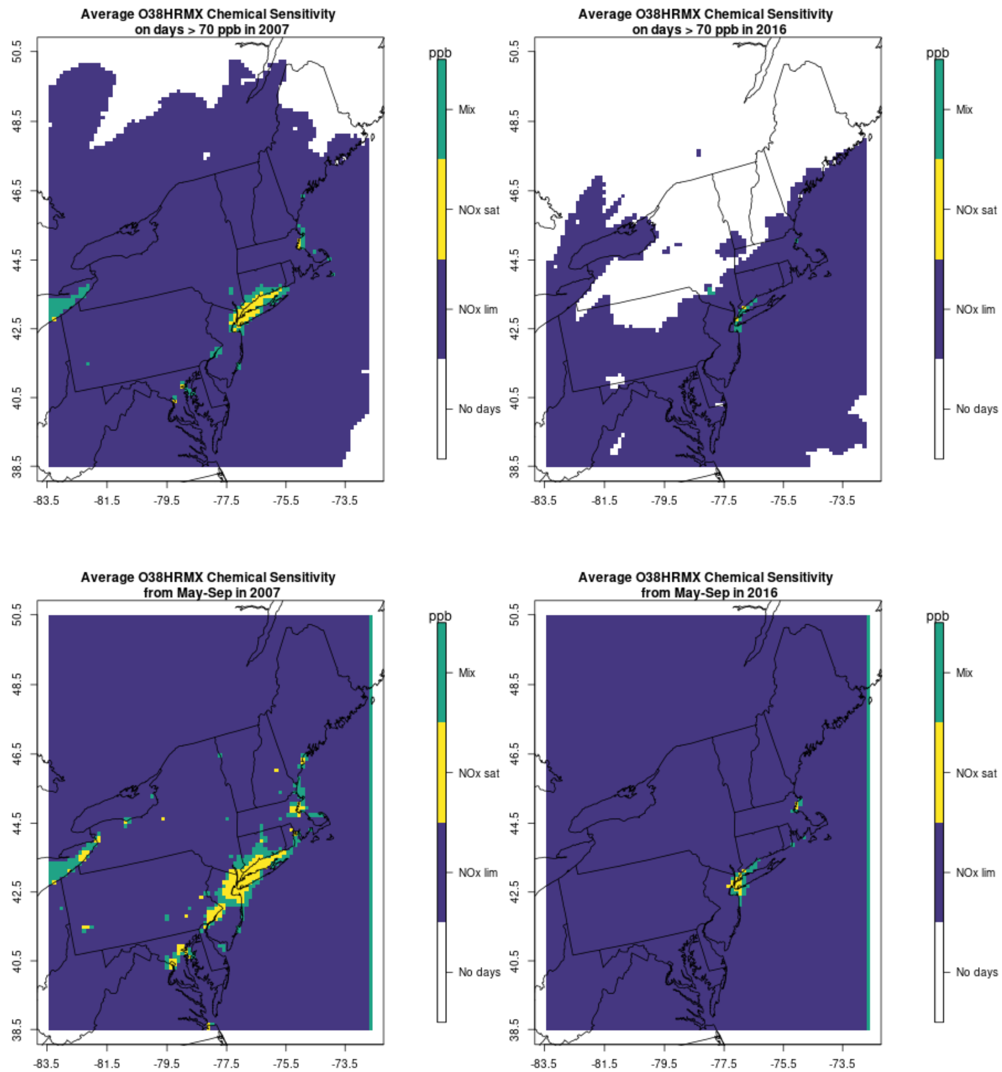


Figure S20: Northeast model-predicted average O_3 chemical formation regime on days with MDA8 O_3 > 70 ppb (top panels) and across all May-Sep days (bottom panels) in 2007 (left panels) and 2016 (right panels)

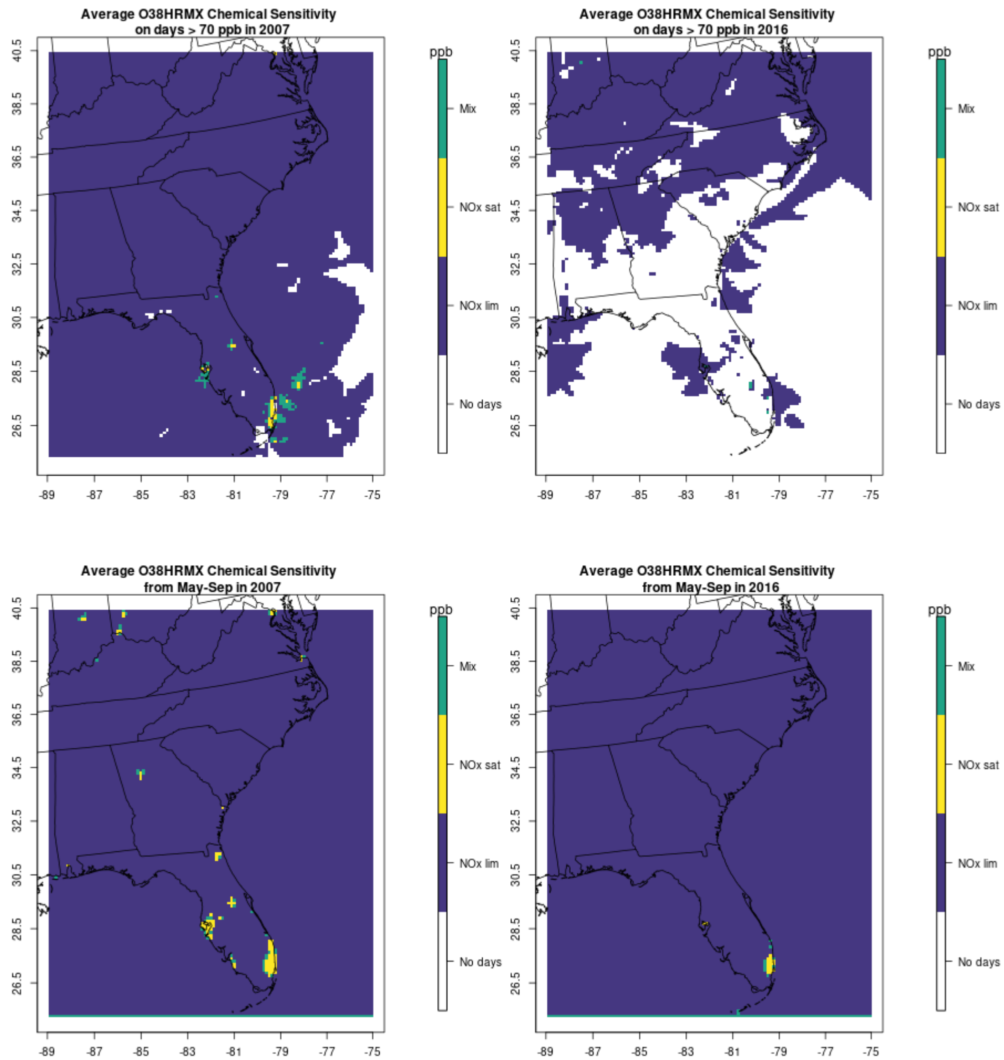


Figure S21: Southeast model-predicted average O_3 chemical formation regime on days with MDA8 O_3 > 70 ppb (top panels) and across all May-Sep days (bottom panels) in 2007 (left panels) and 2016 (right panels)

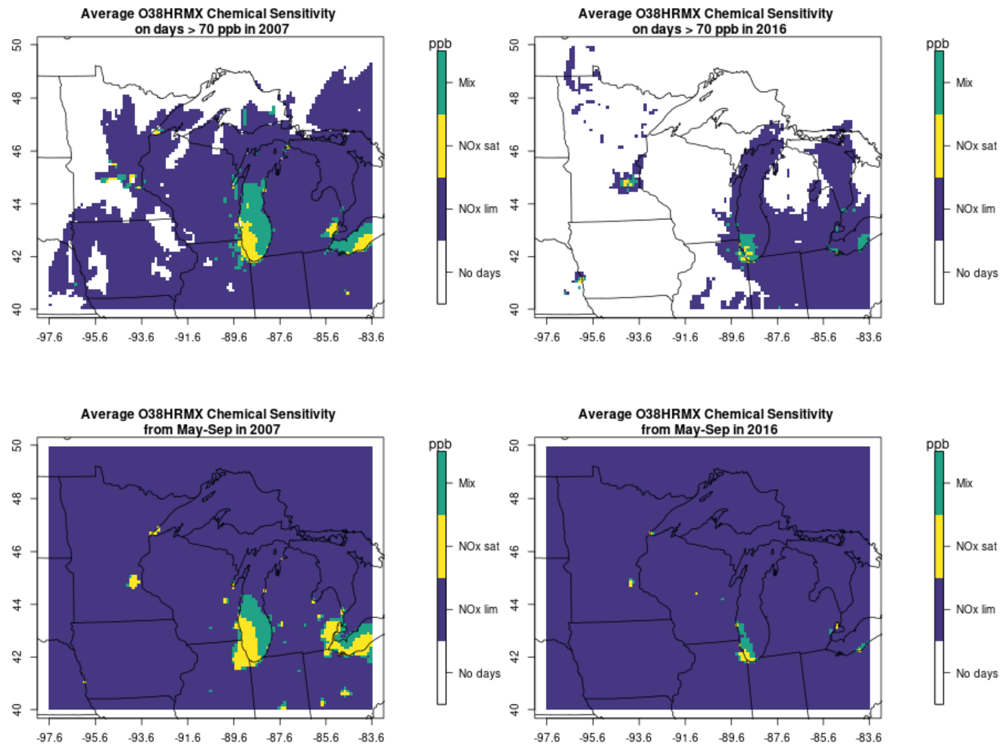


Figure S22: Upper Midwest model-predicted average O_3 chemical formation regime on days with MDA8 O_3 > 70 ppb (top panels) and across all May-Sep days (bottom panels) in 2007 (left panels) and 2016 (right panels)

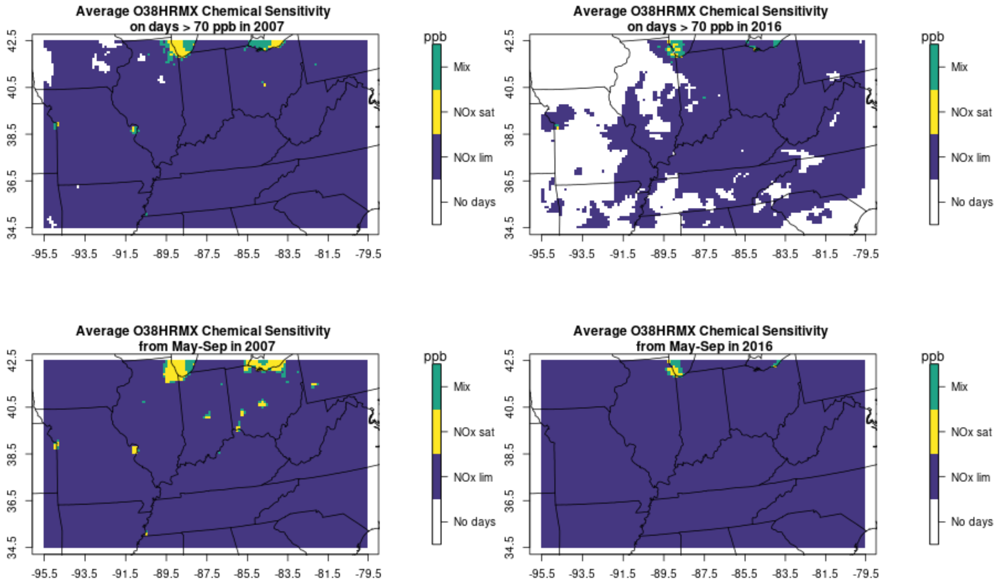


Figure S23: Ohio River Valley model-predicted average O_3 chemical formation regime on days with MDA8 O_3 > 70 ppb (top panels) and across all May-Sep days (bottom panels) in 2007 (left panels) and 2016 (right panels)

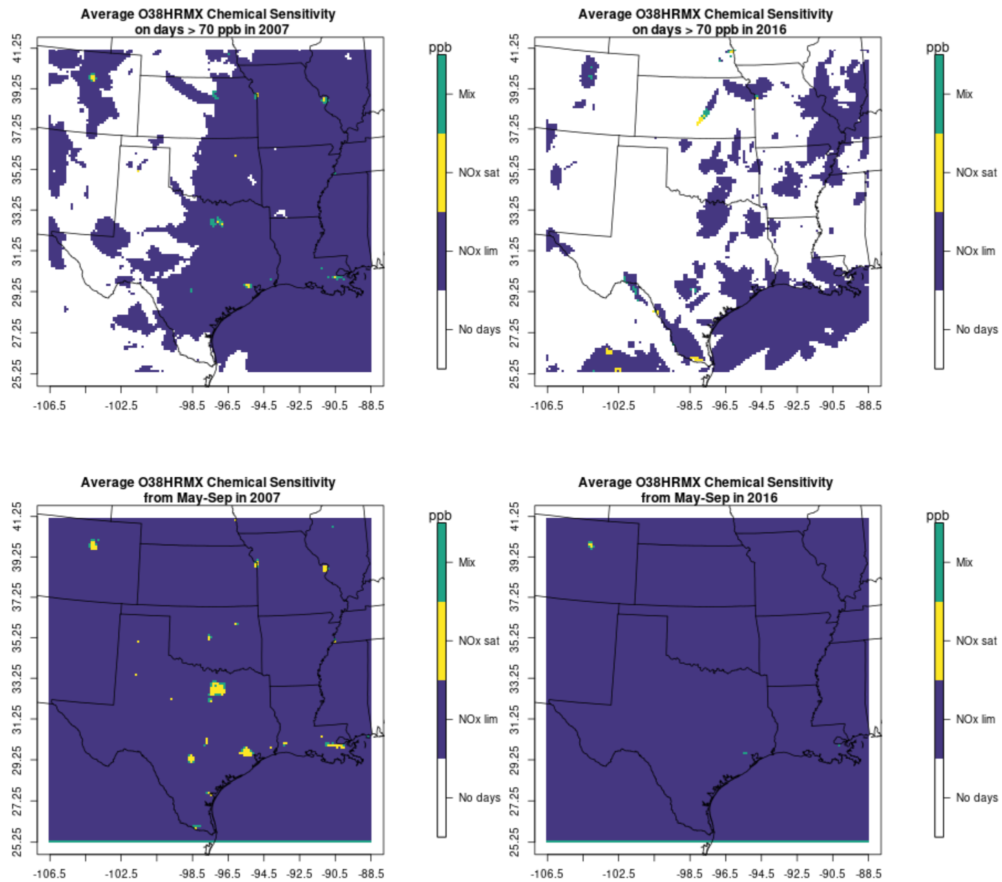


Figure S24: South model-predicted average O_3 chemical formation regime on days with MDA8 O_3 > 70 ppb (top panels) and across all May-Sep days (bottom panels) in 2007 (left panels) and 2016 (right panels)

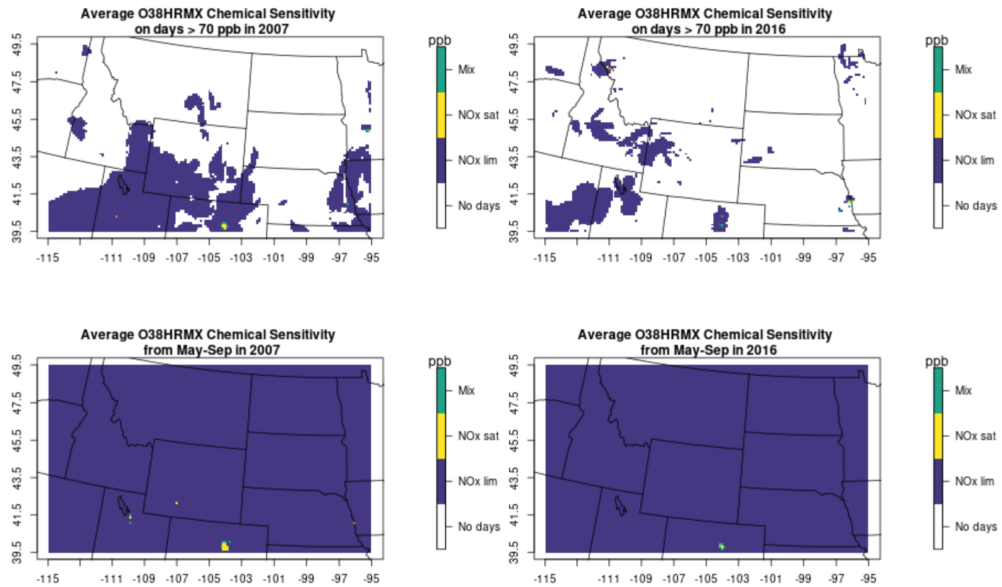


Figure S25: Northern Rockies and Plains model-predicted average O_3 chemical formation regime on days with MDA8 O_3 > 70 ppb (top panels) and across all May-Sep days (bottom panels) in 2007 (left panels) and 2016 (right panels)

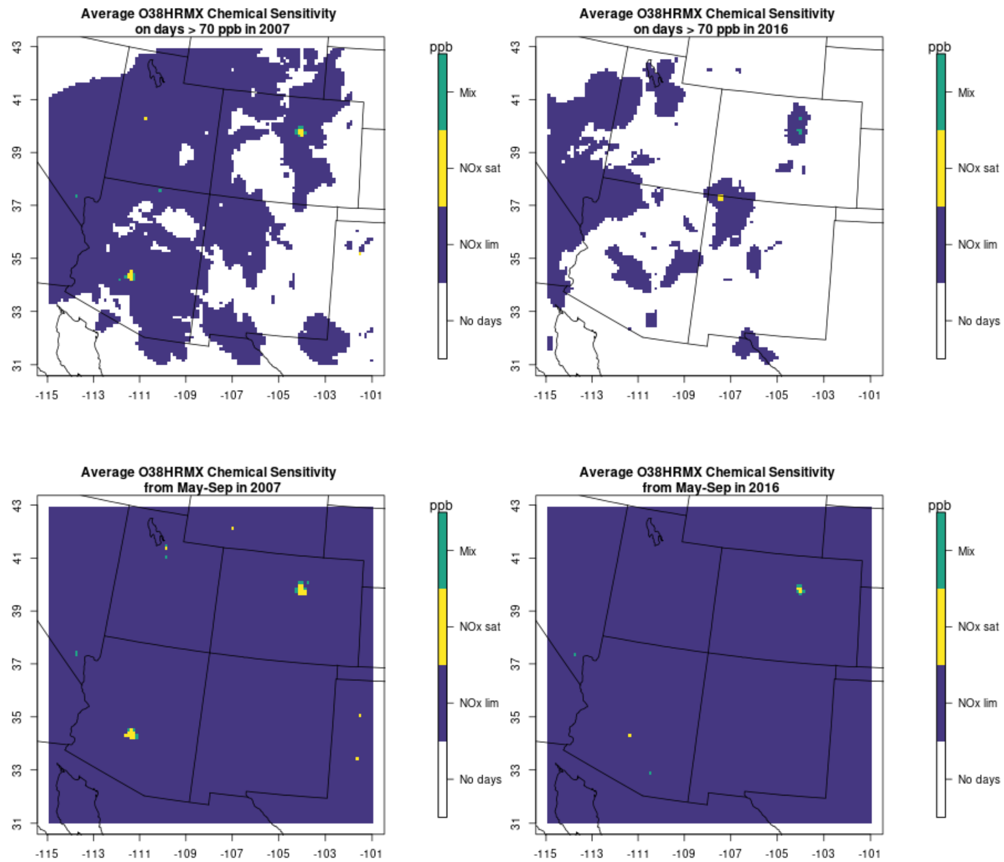


Figure S26: Southwest model-predicted average O_3 chemical formation regime on days with MDA8 O_3 > 70 ppb (top panels) and across all May-Sep days (bottom panels) in 2007 (left panels) and 2016 (right panels)

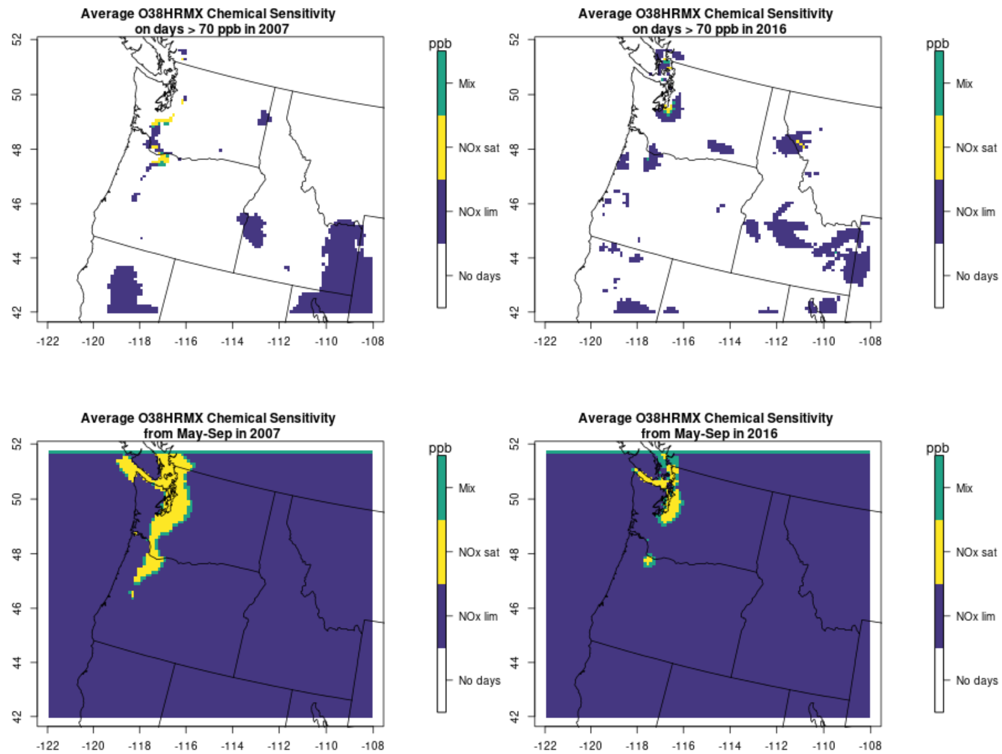


Figure S27: Northwest model-predicted average O_3 chemical formation regime on days with MDA8 O_3 > 70 ppb (top panels) and across all May-Sep days (bottom panels) in 2007 (left panels) and 2016 (right panels)

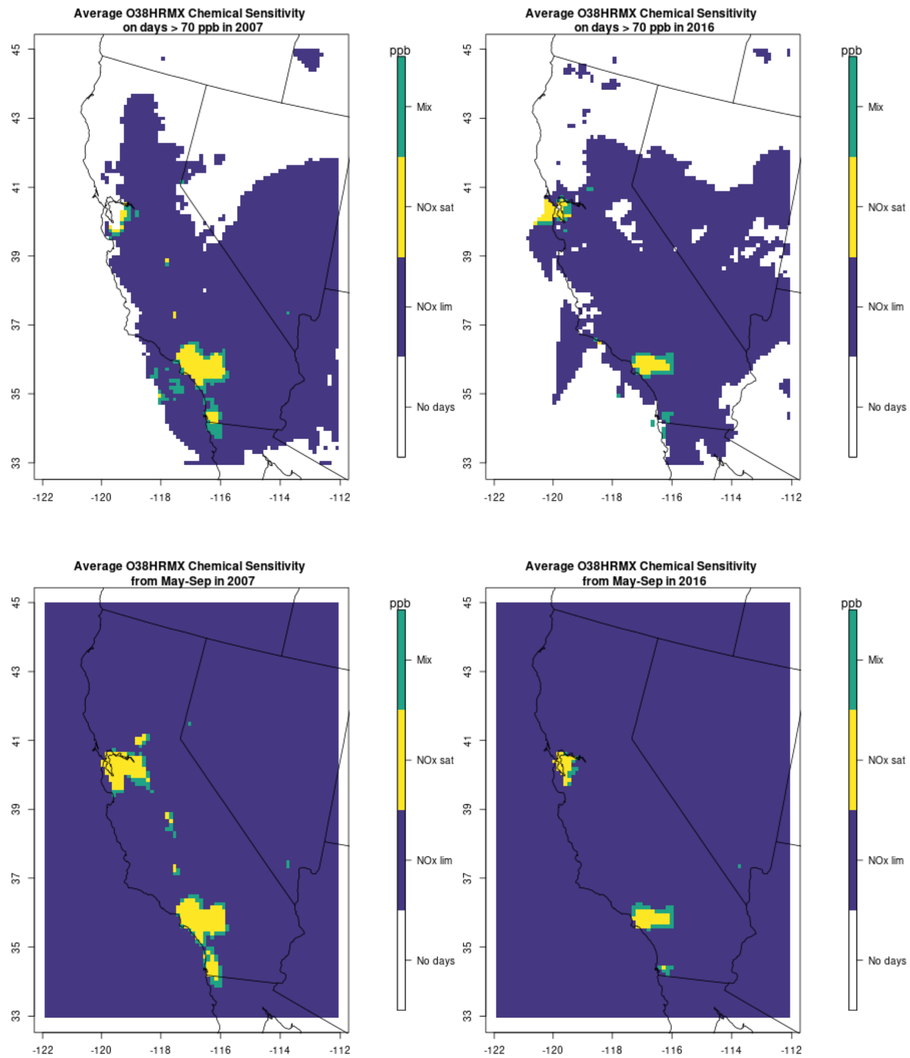


Figure S28: West model-predicted average O_3 chemical formation regime on days with MDA8 O_3 > 70 ppb (top panels) and across all May-Sep days (bottom panels) in 2007 (left panels) and 2016 (right panels)

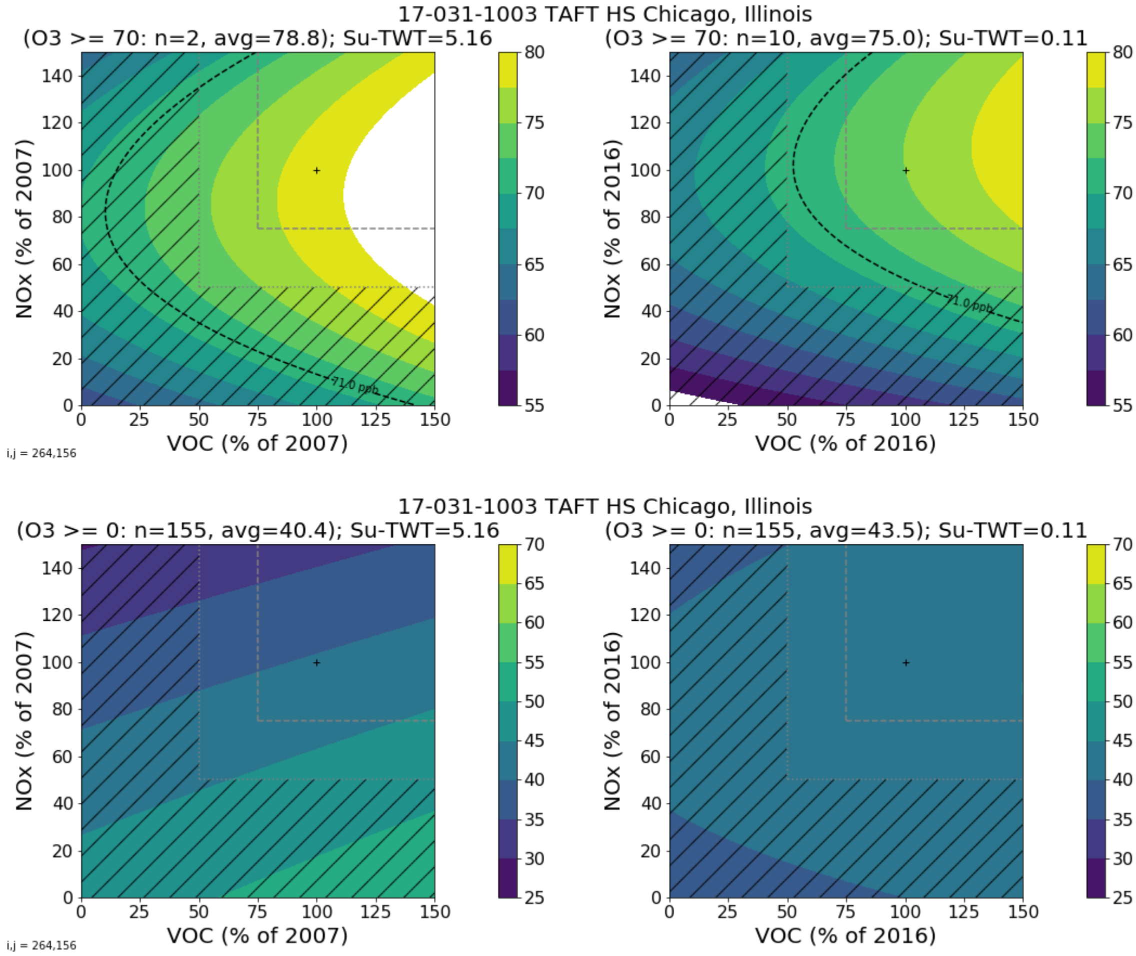
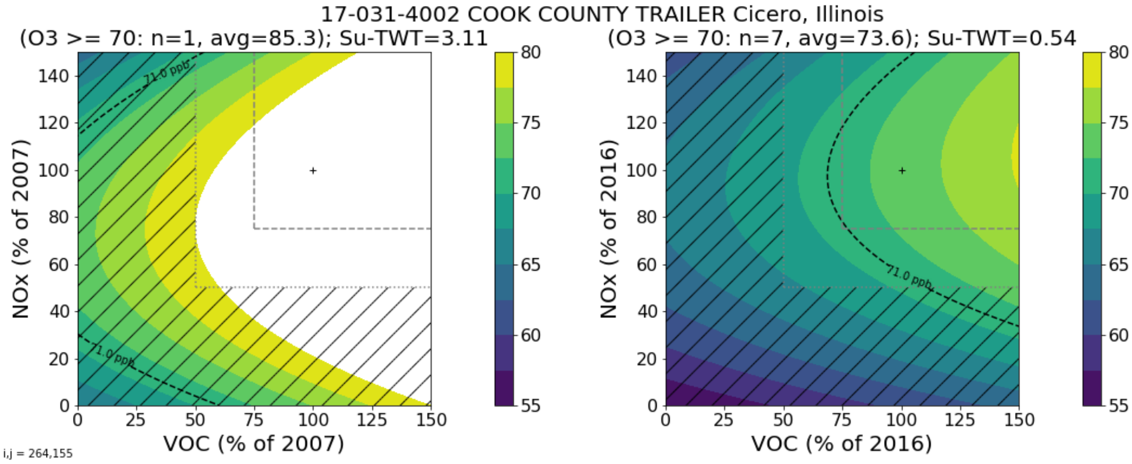


Figure S29. Ozone isopleth diagrams in 2007 (left) and 2016 (right) for all MDA8 (O3>0) (bottom) and high MDA8 (O3>70) (top) for the monitor located southeast of O'Hare International airport. Dashed lines are shown at 50% and 75% of original emissions, and hatching covers the area where large emission reductions (of 50-100%) are outside the domain of expected HDDM accuracy. The dotted curved line depicts locations in the Ozone isopleth space that match 71 ppb MDA8 O_3, below which the site would not be modeling exceedances of the 2015 ozone NAAQS.



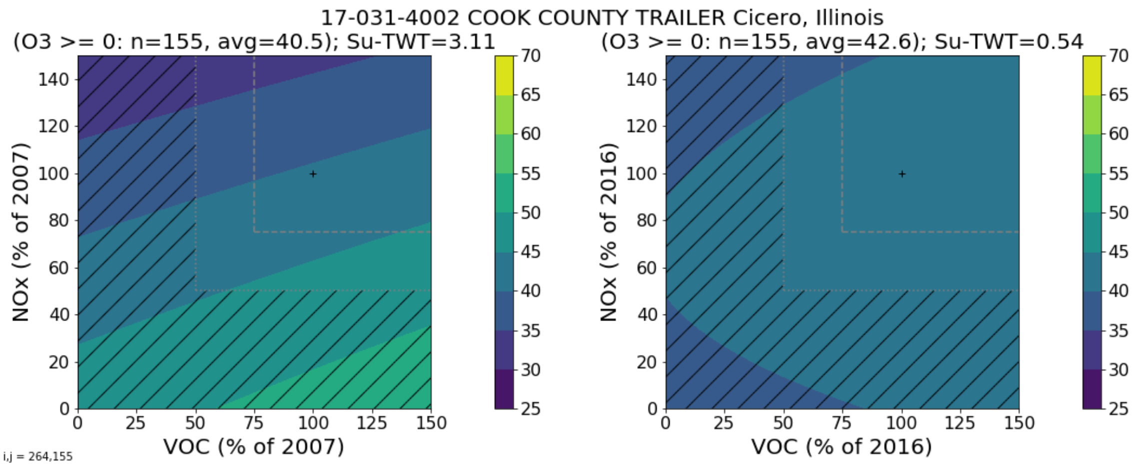
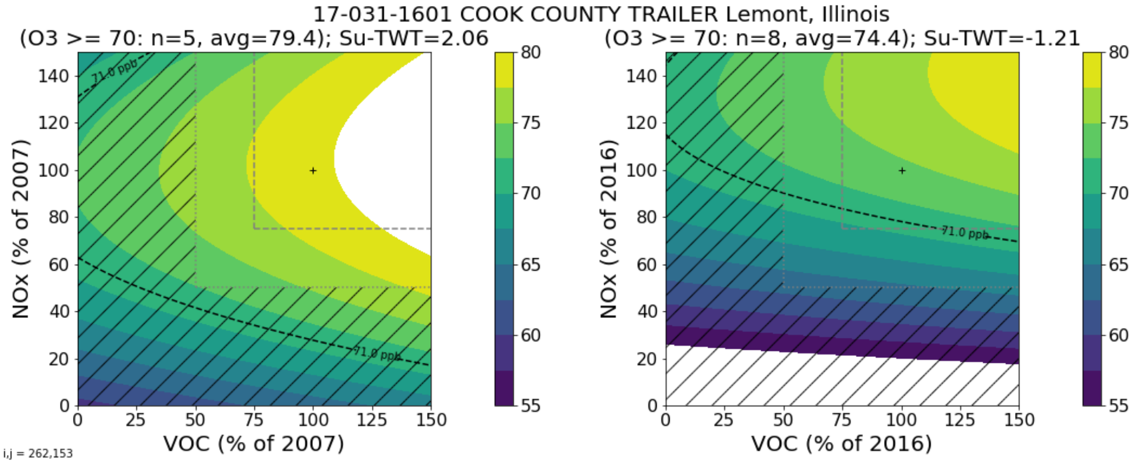


Figure S30. Ozone isopleth diagrams in 2007 (left) and 2016 (right) for all MDA8 (O3>0) (bottom) and high MDA8 (O3>70) (top) for the Cicero, IL monitor. Dashed lines are shown at 50% and 75% of original emissions, and hatching covers the area where large emission reductions (of 50-100%) are outside the domain of expected HDDM accuracy. The dotted curved line depicts locations in the Ozone isopleth space that match 71 ppb MDA8 O_3, below which the site would not be modeling exceedances of the 2015 ozone NAAQS.



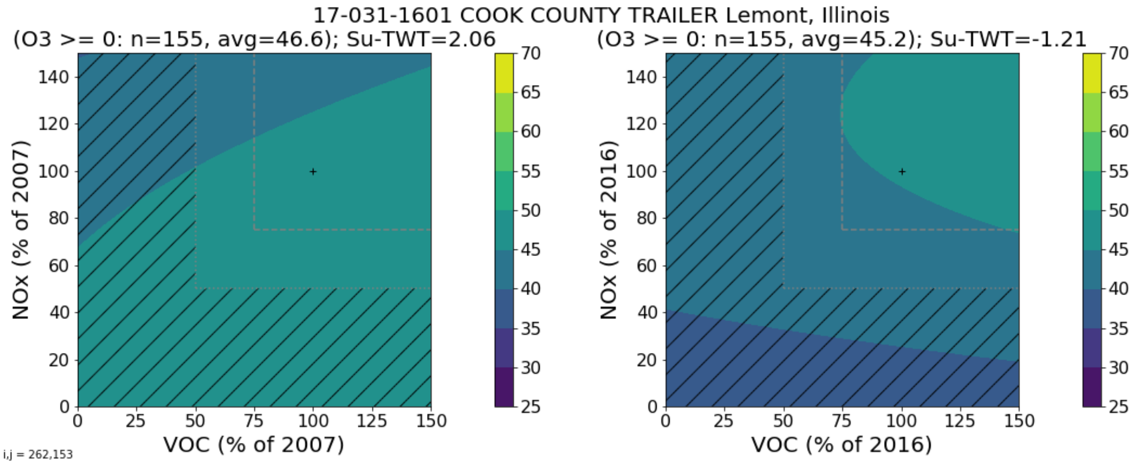


Figure S31. Ozone isopleth diagrams in 2007 (left) and 2016 (right) for all MDA8 (O3>0) (bottom) and high MDA8 (O3>70) (top) for the Lemont, IL monitor. Dashed lines are shown at 50% and 75% of original emissions, and hatching covers the area where large emission reductions (of 50-100%) are outside the domain of expected HDDM accuracy. The dotted curved line depicts locations in the Ozone isopleth space that match 71 ppb MDA8 O_3, below which the site would not be modeling exceedances of the 2015 ozone NAAQS.

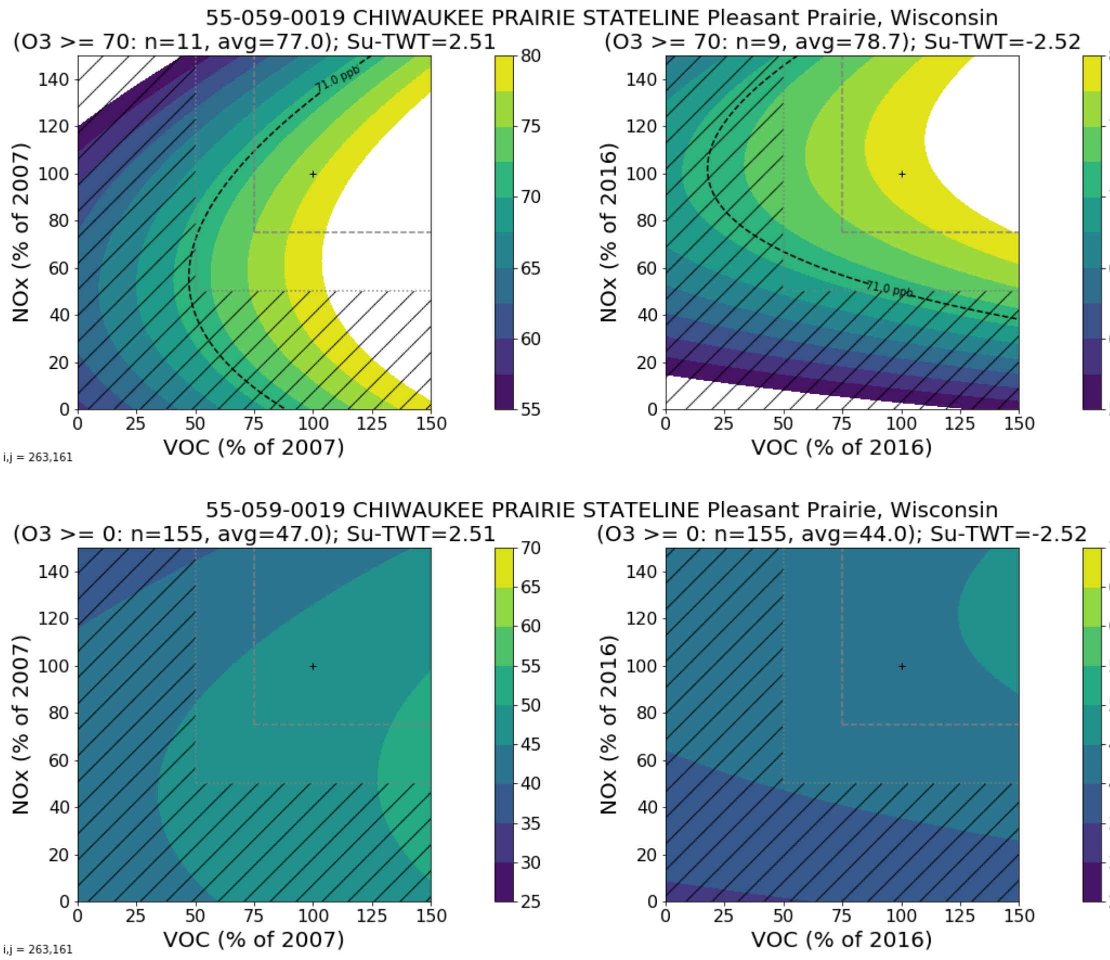
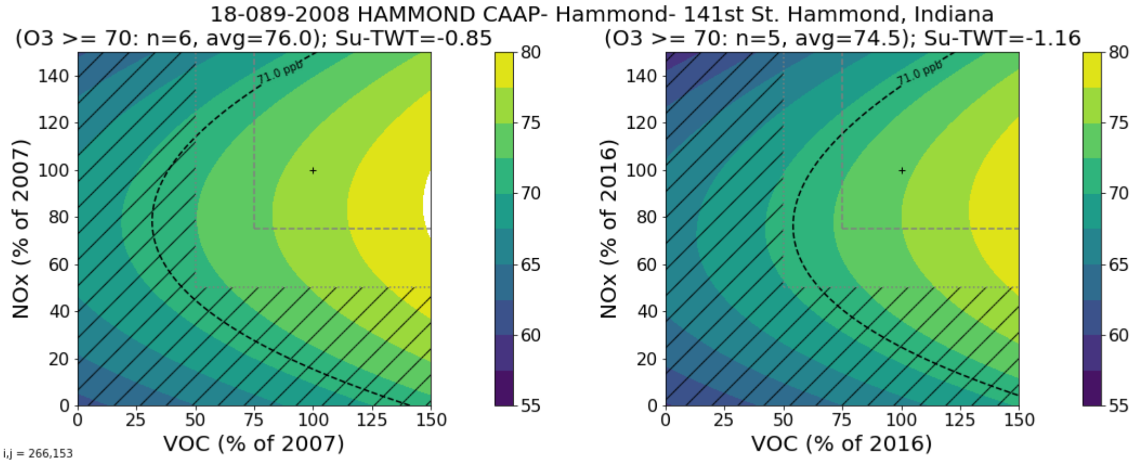


Figure S32. Ozone isopleth diagrams in 2007 (left) and 2016 (right) for all MDA8 (O3>0) (bottom) and high MDA8 (O3>70) (top) for the Kenosha, WI monitor. Dashed lines are shown at 50% and 75% of original emissions, and hatching covers the area where large emission reductions (of 50-100%) are outside the domain of expected HDDM accuracy. The dotted curved line depicts locations in the Ozone isopleth space that match 71 ppb MDA8 O_3, below which the site would not be modeling exceedances of the 2015 ozone NAAQS.



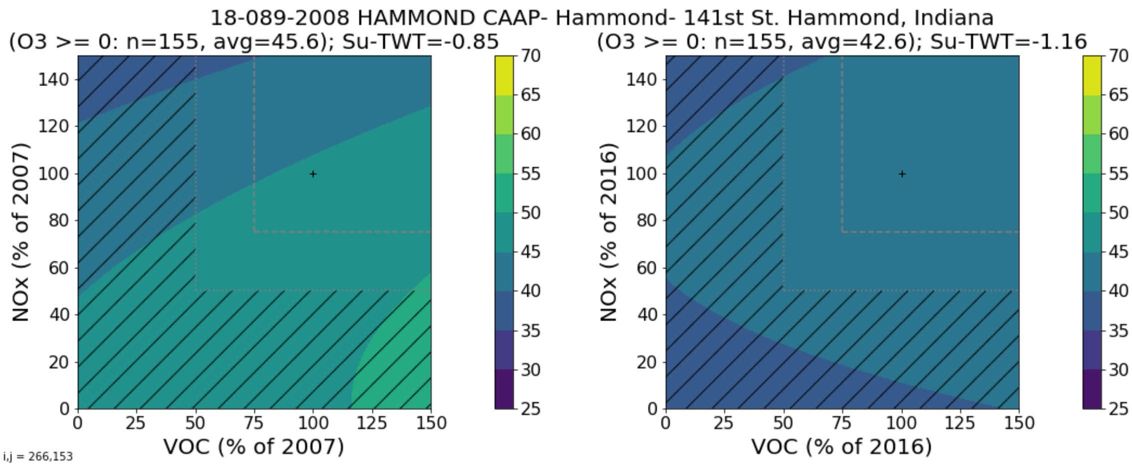
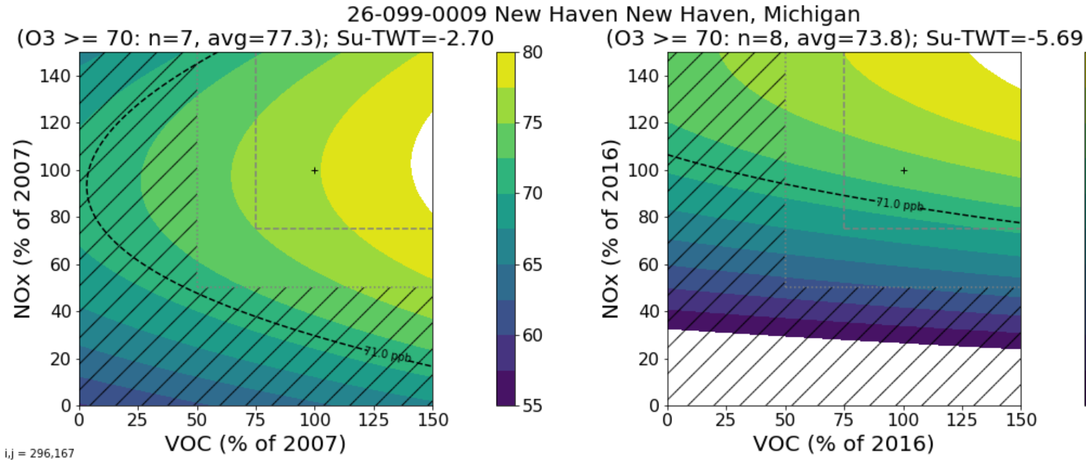


Figure S33. Ozone isopleth diagrams in 2007 (left) and 2016 (right) for all MDA8 (O3>0) (bottom) and high MDA8 (O3>70) (top) for the Hammond, IN monitor. Dashed lines are shown at 50% and 75% of original emissions, and hatching covers the area where large emission reductions (of 50-100%) are outside the domain of expected HDDM accuracy. The dotted curved line depicts locations in the Ozone isopleth space that match 71 ppb MDA8 O_3, below which the site would not be modeling exceedances of the 2015 ozone NAAQS.



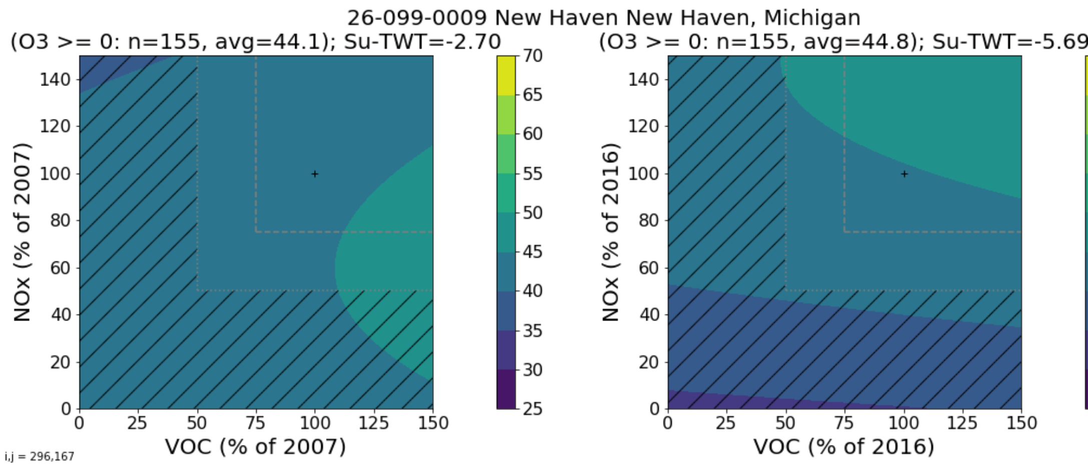
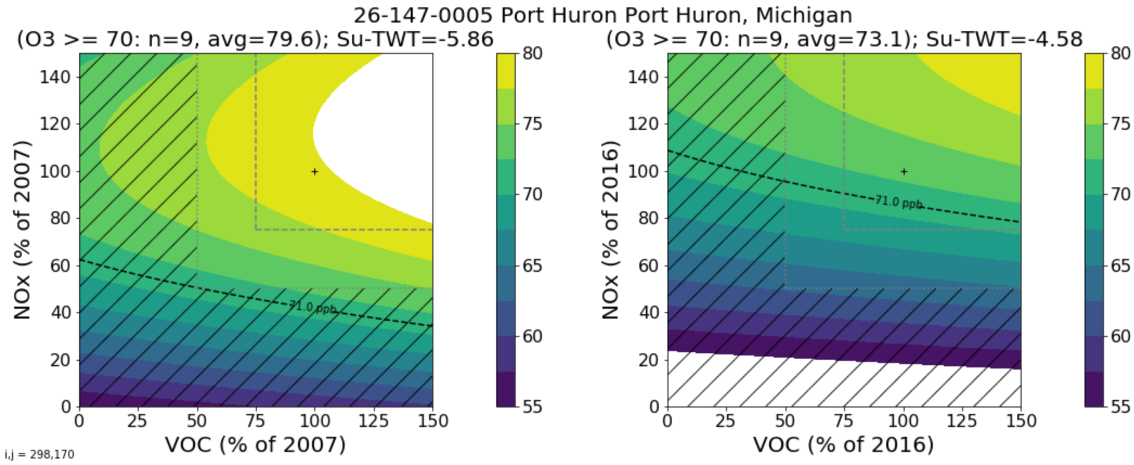


Figure S34. Ozone isopleth diagrams in 2007 (left) and 2016 (right) for all MDA8 (O3>0) (bottom) and high MDA8 (O3>70) (top) for the New Haven, MI monitor. Dashed lines are shown at 50% and 75% of original emissions, and hatching covers the area where large emission reductions (of 50-100%) are outside the domain of expected HDDM accuracy. The dotted curved line depicts locations in the Ozone isopleth space that match 71 ppb MDA8 O_3, below which the site would not be modeling exceedances of the 2015 ozone NAAQS.



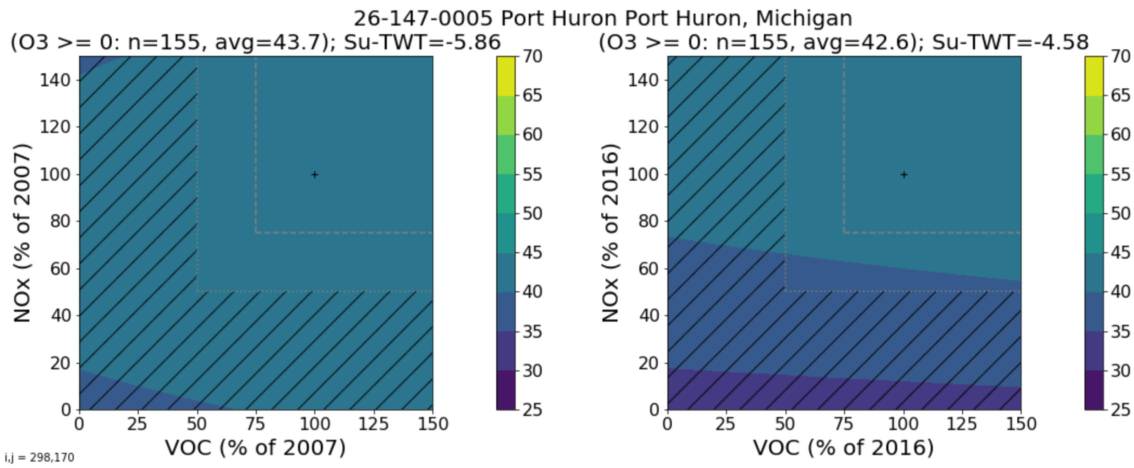


Figure S35. Ozone isopleth diagrams in 2007 (left) and 2016 (right) for all MDA8 (O3>0) (bottom) and high MDA8 (O3>70) (top) for the Port Huron, MI monitor. Dashed lines are shown at 50% and 75% of original emissions, and hatching covers the area where large emission reductions (of 50-100%) are outside the domain of expected HDDM accuracy. The dotted curved line depicts locations in the Ozone isopleth space that match 71 ppb MDA8 O_3, below which the site would not be modeling exceedances of the 2015 ozone NAAQS.

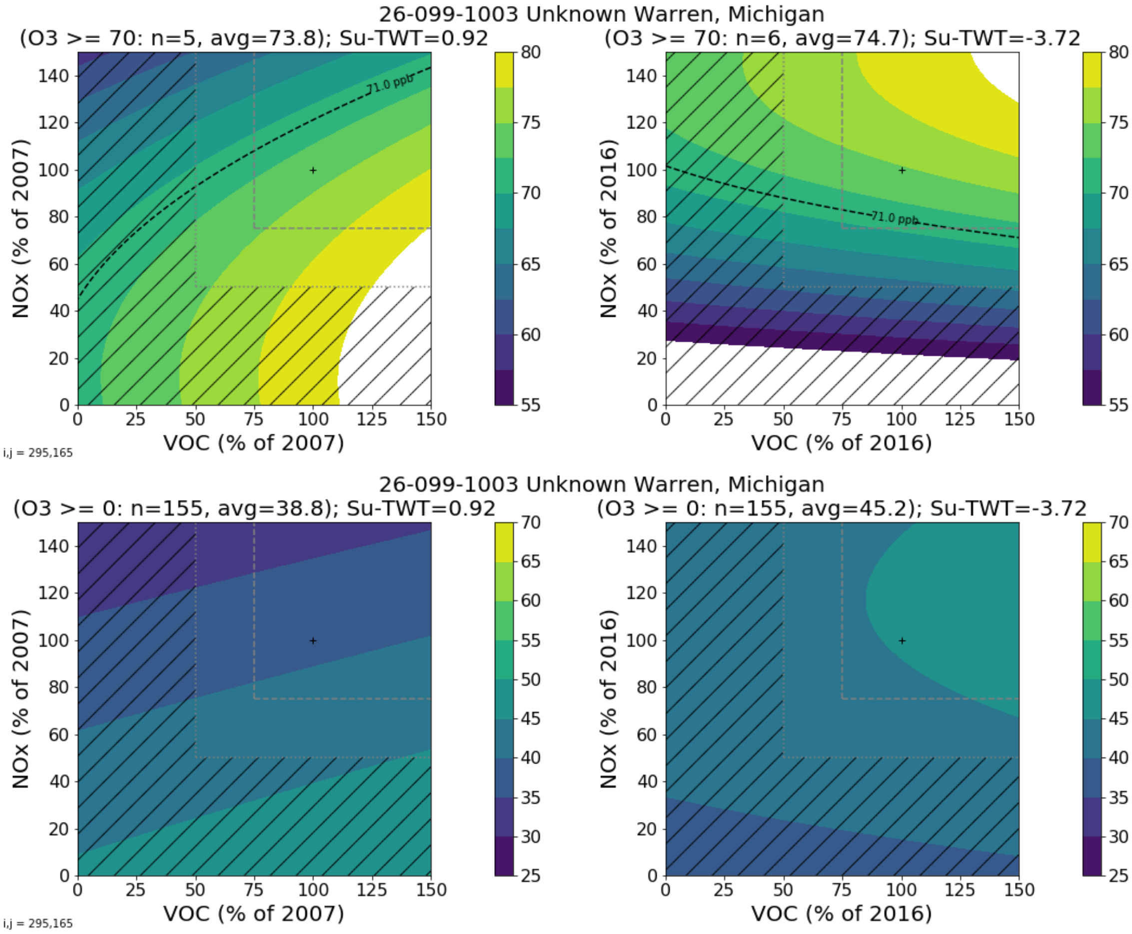


Figure S36. Ozone isopleth diagrams in 2007 (left) and 2016 (right) for all MDA8 (O3>0) (bottom) and high MDA8 (O3>70) (top) for the Warren, MI monitor. Dashed lines are shown at 50% and 75% of original emissions, and hatching covers the area where large emission reductions (of 50-100%) are outside the domain of expected HDDM accuracy. The dotted curved line depicts locations in the Ozone isopleth space that match 71 ppb MDA8 O_3, below which the site would not be modeling exceedances of the 2015 ozone NAAQS.

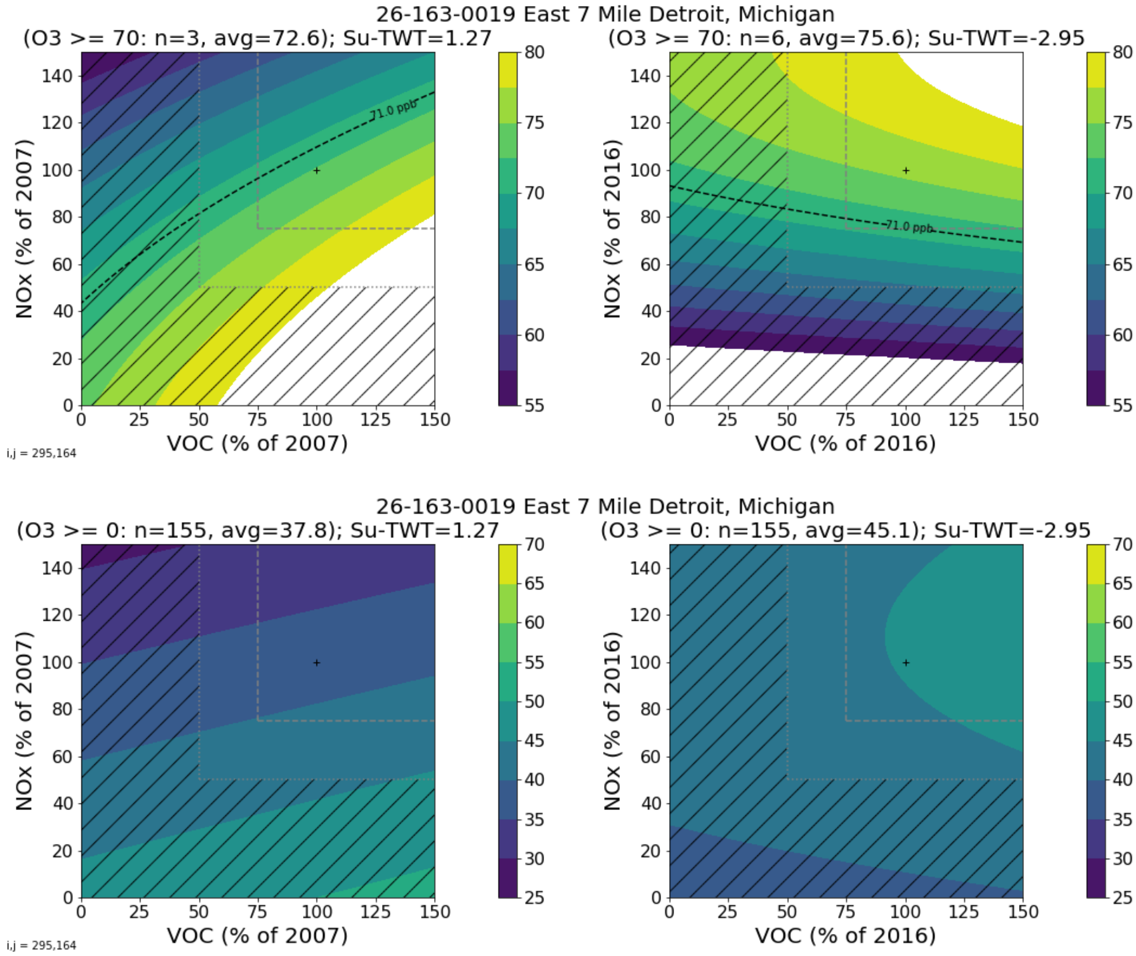
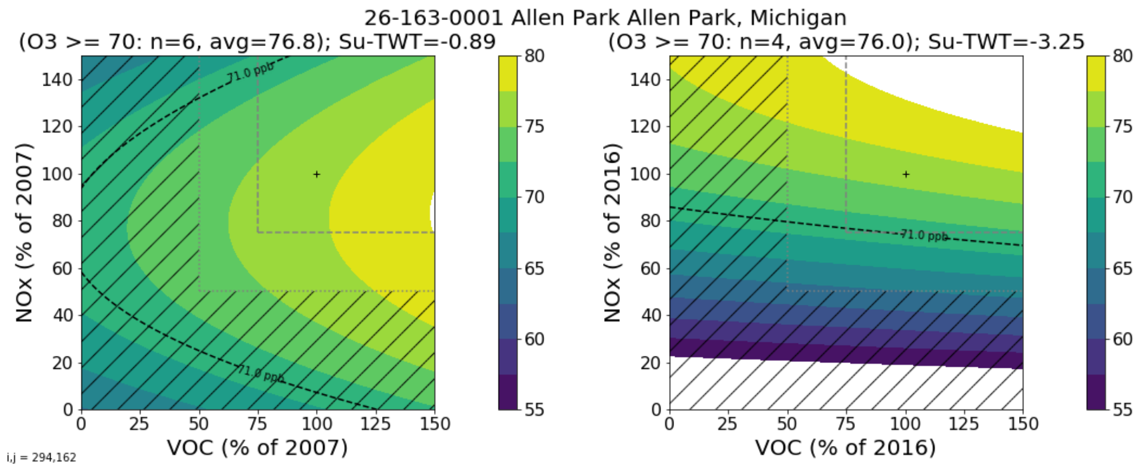


Figure S37. Ozone isopleth diagrams in 2007 (left) and 2016 (right) for all MDA8 (O3>0) (bottom) and high MDA8 (O3>70) (top) for the East 7 Mile, MI monitor. Dashed lines are shown at 50% and 75% of original emissions, and hatching covers the area where large emission reductions (of 50-100%) are outside the domain of expected HDDM accuracy. The dotted curved line depicts locations in the Ozone isopleth space that match 71 ppb MDA8 O_3, below which the site would not be modeling exceedances of the 2015 ozone NAAQS.



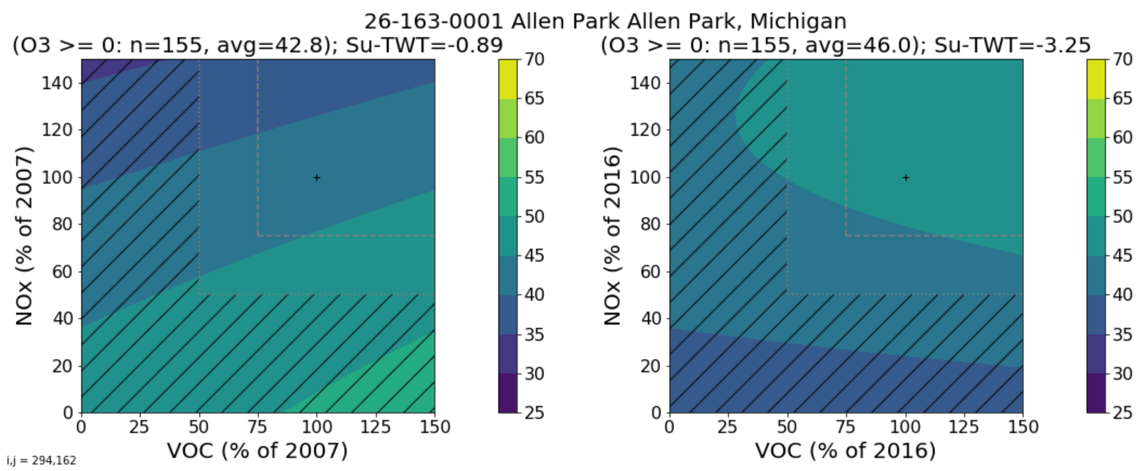


Figure S38. Ozone isopleth diagrams in 2007 (left) and 2016 (right) for all MDA8 (O3>0) (bottom) and high MDA8 (O3>70) (top) for the Allen Park, MI monitor. Dashed lines are shown at 50% and 75% of original emissions, and hatching covers the area where large emission reductions (of 50-100%) are outside the domain of expected HDDM accuracy. The dotted curved line depicts locations in the Ozone isopleth space that match 71 ppb MDA8 O_3, below which the site would not be modeling exceedances of the 2015 ozone NAAQS.

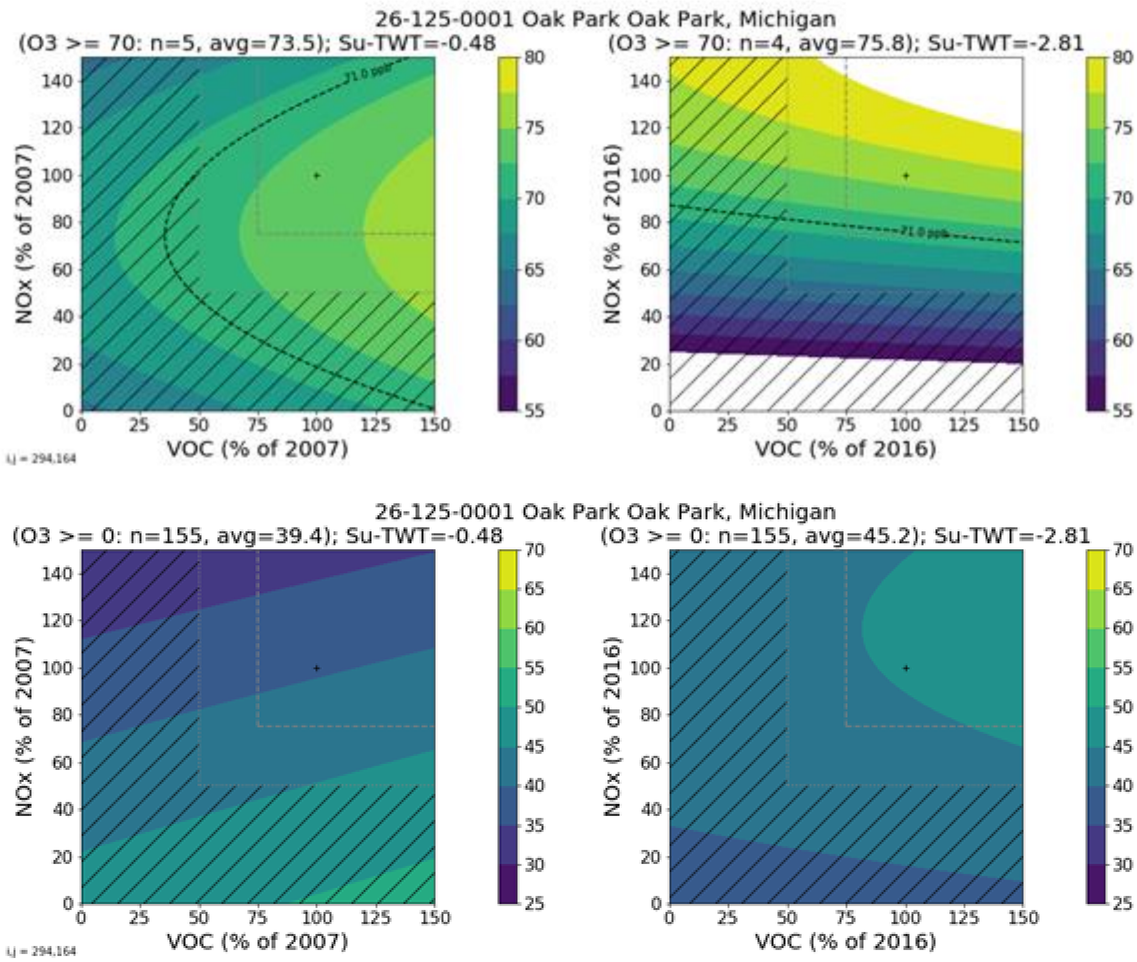
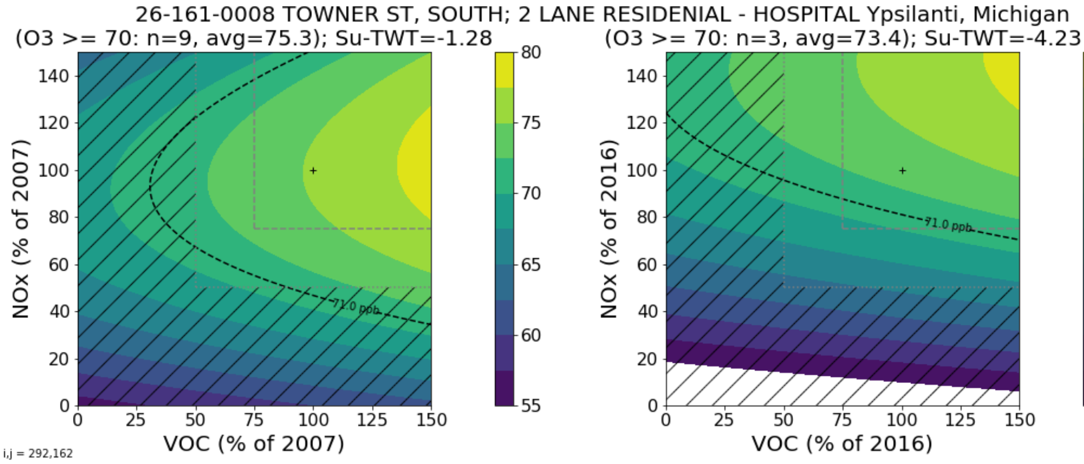


Figure S39. Ozone isopleth diagrams in 2007 (left) and 2016 (right) for all MDA8 (O3>0) (bottom) and high MDA8 (O3>70) (top) for the Oak Park, MI monitor. Dashed lines are shown at 50% and 75% of original emissions, and hatching covers the area where large emission reductions (of 50-100%) are outside the domain of expected HDDM accuracy. The dotted curved line depicts locations in the Ozone isopleth space that match 71 ppb MDA8 O_3, below which the site would not be modeling exceedances of the 2015 ozone NAAQS.



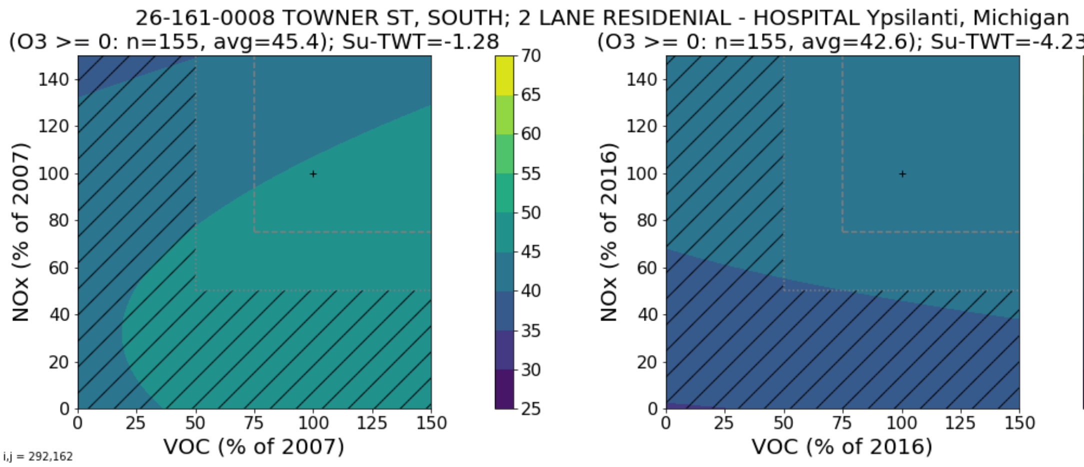


Figure S40. Ozone isopleth diagrams in 2007 (left) and 2016 (right) for all MDA8 (O3>0) (bottom) and high MDA8 (O3>70) (top) for the Ypsilanti, MI monitor. Dashed lines are shown at 50% and 75% of original emissions, and hatching covers the area where large emission reductions (of 50-100%) are outside the domain of expected HDDM accuracy. The dotted curved line depicts locations in the Ozone isopleth space that match 71 ppb MDA8 O_3, below which the site would not be modeling exceedances of the 2015 ozone NAAQS.

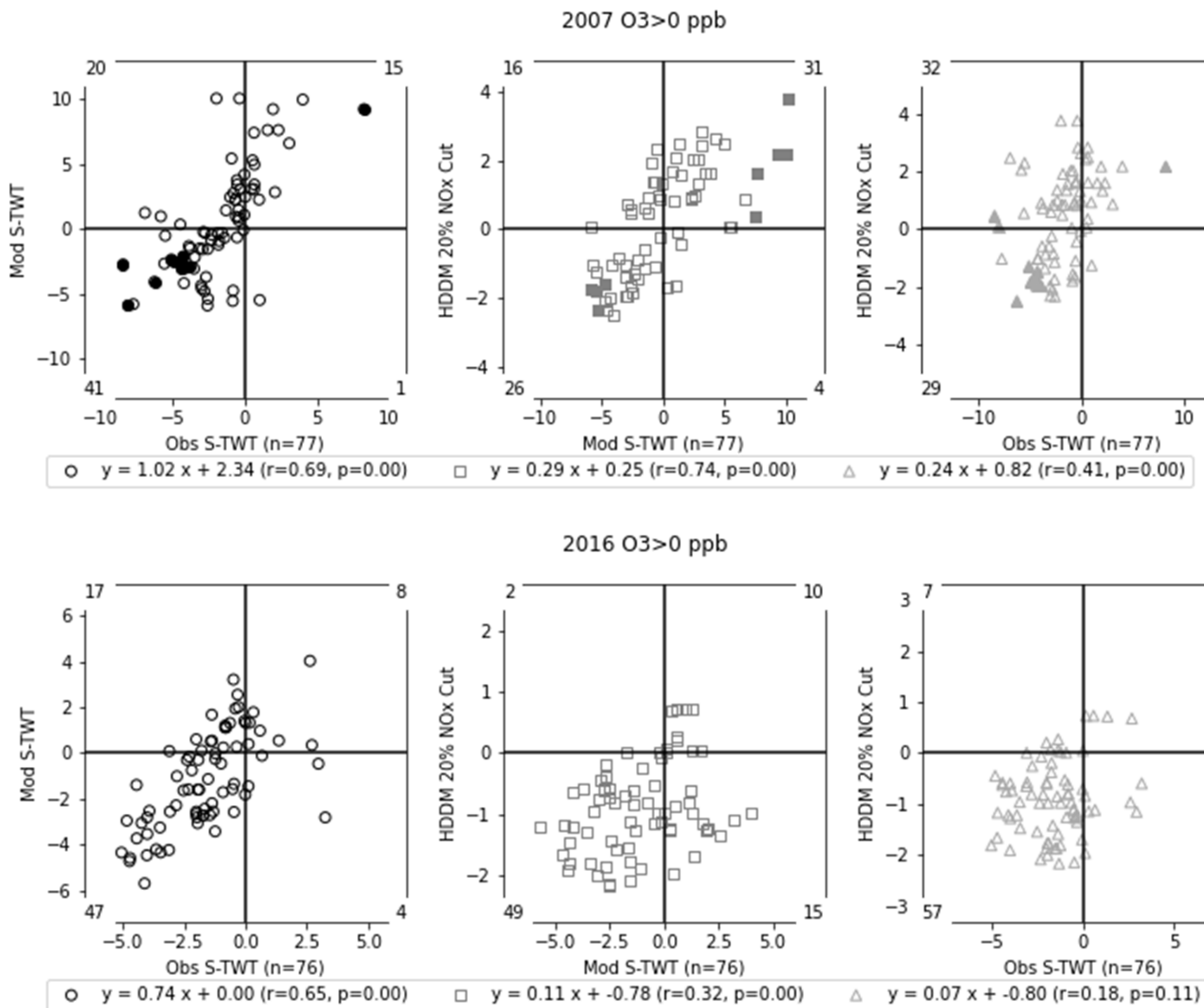


Figure S41. Comparison of (left) modeled vs. observed WE-WD differential, (middle) ozone response to a 20% NOx cut calculated with the HDDM sensitivities vs. modeled WE-WD differential, and (right) ozone response to a 20% NOx cut calculated with the HDDM sensitivities vs. observed WE-WD differential for (top) 2007 and (bottom) 2016.

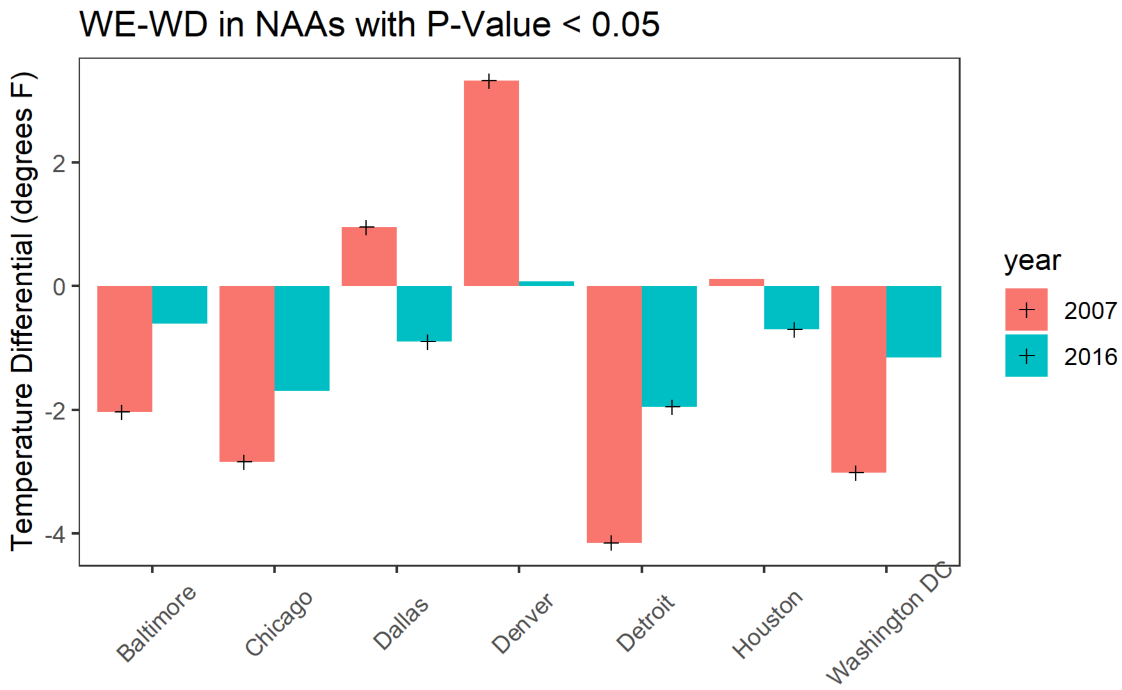


Figure S42. Non-attainment area (NAA) WE-WD temperature differentials from the AQS network with p-value < 0.05 in either 2007 or 2016. Crosses indicate significant p-value for that year.