

The Role of Background O₃ in the NAAQS Review

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CAA Requires CASAC

- To “advise the Administrator on the relative contribution to air pollution concentrations of natural as well as anthropogenic activity...”

Present Review Estimates USB by 2 Methods

- CMAQ modeling system with anthropogenic US emissions zeroed out
- CAMx with APCA (Anthropogenic Precursor Culpability Assessment Tool)
- Neither method addresses “how much of the O_3 in a given area is due to background contributions”

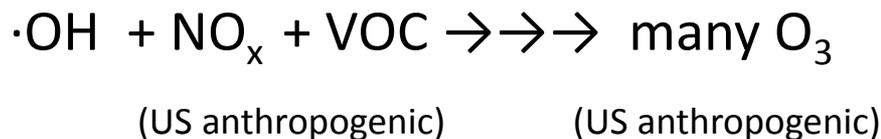
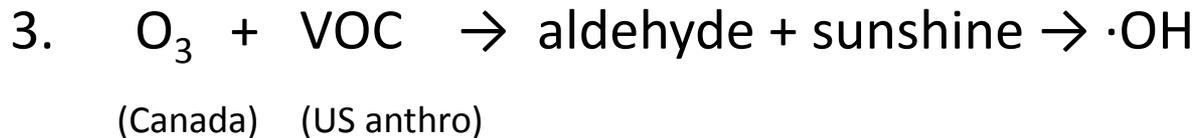
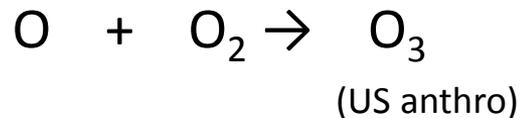
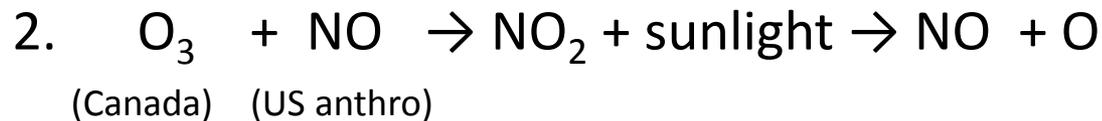
CMAQ and Zeroing Out US

- Limitations
 - Not realistic
 - Alters atmospheric chemistry in non-linear fashion
- More Realistic Alternative
 - Run unperturbed base case
 - Zero out all non US contributions and US biogenic emissions
 - Difference provides impact of USB

CAMx with Source Apportionment

- CAMx with APCA (Anthropogenic Precursor Culpability Assessment Tool)
 - Underestimates USB and impact of USB
 - Assigns culpability to anthropogenic sources for control strategy development purposes
 - Does not propagate effect of USB throughout US

Why APCA Estimates Are Biased Low



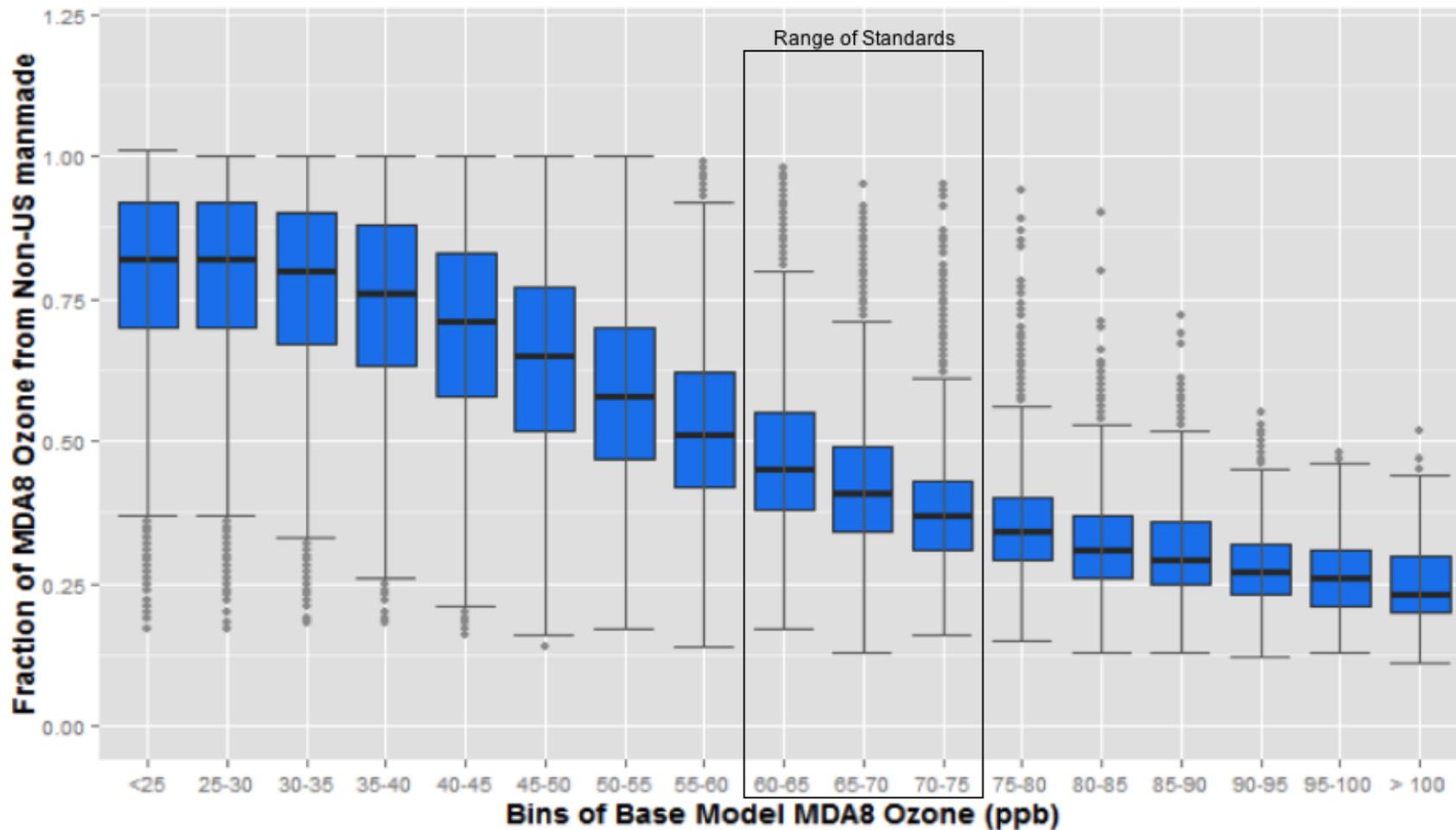
CAMx

- Need accounting procedure to track the sources of odd oxygen associated with USB across the country to determine “how much of the O_3 measured or simulated in a given area is due to background contributions.”

Even though EPA's USB estimates are biased low, they are significant

All days, CAMx	ATL	BAL	BOS	CLE	DEN	DET	HOU	LA	NYC	PHI	SAC	STL
Model MDA8 seasonal mean	59.3	54.4	43.0	48.9	47.3	39.1	48.5	51.1	45.4	48.7	46.4	49.8
Model MDA8 seasonal mean from emissions other than U.S. anthropogenic sources	25.3	25.9	26.2	25.7	31.3	23.3	27.0	29.1	24.5	24.2	29.7	24.3
Fractional contribution from background	0.43	0.48	0.61	0.52	0.66	0.60	0.56	0.57	0.54	0.50	0.64	0.49

Source: U.S. EPA Second Draft PA, Table 2-1



Distribution of MDA8 ozone fractions from non-U.S. anthropogenic sources at monitoring locations across the U.S. (Apr-Oct), binned by base modeled site-day MDA8, as estimated by the 2007 CAMx simulation.

Source: U.S. EPA Second Draft PA, Figure 2-14

Despite the significant contribution of USB to MDA8, EPA ignores USB in the health risk assessment as they estimate risk to zero O_3

EPA Ignores USB in Welfare REA

- Because of the low weight W126 gives to USB by itself, EPA concludes that the background is not an important consideration in considering welfare risk

- Example - Denver

– USB = 40 ppb = 1.5 ppm-hrs

– Anthro = 20 ppb

– Total O₃ = 60 ppb = 19.7 ppm-hrs

EPA attributes all the risk to the 20 ppb of anthropogenic O₃ even though 2/3 or 67% is caused by USB

To overcome the significant contribution of USB, massive additional NO_x emission reductions needed

Urban Area	Years	Standard Level*			
		75 ppb	70 ppb	65 ppb	60 ppb
Atlanta	2006-2008	50%	58%	64%	71%
	2008-2010	23%	43%	54%	62%
Baltimore	2006-2008	46%	54%	61%	69%
	2008-2010	44%	52%	60%	67%
Boston	2006-2008	40%	49%	61%	70%
	2008-2010	13%	40%	53%	65%
Chicago	2006-2008	19%	52%	66%	80%
	2008-2010	N/A	27%	55%	70%
Cleveland	2006-2008	48%	61%	73%	88%
	2008-2010	50%	64%	77%	88%
Dallas	2006-2008	50%	57%	65%	72%
	2008-2010	50%	58%	64%	71%
Denver	2006-2008	51%	65%	78%	87%
	2008-2010	15%	46%	64%	87%
Detroit	2006-2008	59%	69%	76%	84%
	2008-2010	N/A	54%	66%	78%
Houston	2006-2008	62%	68%	74%	82%
	2008-2010	42%	53%	63%	75%
Los Angeles	2006-2008	87.1%	89.3%	91.2%	93.2%
	2008-2010	87%	89%	91%	93%
New York	2006-2008	64%	74%	92%	N/A
	2008-2010	52%	67%	89%	N/A
Philadelphia	2006-2008	54%	61%	68%	74%
	2008-2010	42%	52%	61%	68%
Sacramento	2006-2008	63%	70%	76%	84% ⁵
	2008-2010	64%	71%	77%	84%
Saint Louis	2006-2008	45%	56%	66%	75%
	2008-2010	10%	34%	50%	63%
Washington D.C.	2006-2008	53%	60%	67%	74%
	2008-2010	31%	50%	60%	71%

* N/A values for the 75 ppb standard level mean that a particular urban area did not have any design values above 75 for that 3-year period so no controls were needed. N/A values for the 60 ppb standard level mean that this adjustment methodology was not able to bring design values down to 60 for that particular city and 3-year period.

NOx Reductions Needed to Meet Primary NAAQS

Source: U.S.EPA
2nd Draft HREA
Ch. 4 Appendix,
Table 2