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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Ozone response to emission changes: a modeling study during the MCMA-2006/MILAGRO campaign" *by* J. Song et al.

Anonymous Referee #2

Received and published: 8 January 2010

The paper by Song et al. presents a detailed study of the sensitivity of ozone production to NOx and VOC emissions in the MCMA, using the CAMx 3-D photochemical model. This appears to me to be a solid and thoroughly-conducted contribution, and provides a logical extension and update to the work done by this group on MCMA-2003. In particular, the effect of decreasing VOC emissions/reactivity between MCMA-2003 and MCMA-2006 is clearly demonstrated. In my opinion, the paper is suitable for publication in ACP with minor revision, as noted below.

One general question that the authors might want to address in more detail: How well are the VOC budget and the associated OH reactivity toward VOCs actually known? While it appears that the authors have done a very logical and complete job of scaling the emissions inventories to match the available data, I wonder if the authors can offer

any further comment on the possibility of the existence (for example) of unmeasured hydrocarbon species, and the impacts that associated uncertainties might have on the overall results obtained.

A more specific, but related question – it appears from the text near the top of p.23429 that the ALK4 and ALK5 emissions did not need to be altered. Were measurements of the species that fit into these lumped categories (pentane and larger alkanes, I think?) available? – they are not currently listed in Table 1.

Minor comments:

Can a reference be provided for the statement (p. 23423) that RAMA NOx measurements more accurately represent NOy?

Page 23428 (bottom) and Figure 2 – Should there not be more data points to compare with, given that there are 15 RAMA sites being used, more than 20 days under consideration, and potentially 5 hourly measurements per station per day (7am – 11 am)?

Second line of p. 23431 – This should be the VOC/NOx ratio, not NOx/VOC, I think?

Bottom of page 23431 – a minor point, but are the O3 values from CnvS and CnvN days really that different from O3-S days?

Page 23433, and elsewhere – should use ARO2 throughout, no subscript.

Top of p. 23434 – Am I right that the Ox production efficiency referred to is the P(Ox)/P(NOz) ratio, which is not explicitly shown in Fig.9? You might want to add a sentence of explanation here.

p. 23435, and also in the conclusions – I think it is always the case that a reduction in VOCs will lead to a reduction in ozone – i.e., unlike the case with NOx, VOCs never saturate / inhibit the chemistry.

p. 23436 – It is not clear which part(s) of the preceding discussion the authors are

using to justify the concluding sentence of the paragraph, that “This further suggests that ozone formation in the MCMA urban area is VOC-sensitive”. Please clarify.

Very bottom of p. 23437 – should be “was” instead of “were”, I think.

The Sillman and West (2009) paper does not appear in the reference list.

The y-axis label for Fig. 8c is not readable.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 23419, 2009.