

## ***Interactive comment on “Modeled and observed ozone sensitivity to mobile-source emissions in Mexico City” by M. Zavala et al.***

**M. Zavala et al.**

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The authors would like to thank the reviewer for the comments on our paper. We have made several changes in the manuscript to reflect the suggestions given by the reviewer.

### *Author 1*

*The authors have studied trends in ozone and ozone precursors in Mexico City over the last 20 years. They analyze trends in vehicle emission and ambient pollutant concentration measurements, as well as sensitivity analysis results using a 3-D photochemical model applied to the region. Their main finding is that peak ozone levels have declined due to reductions in ozone precursor emissions from gasoline-powered*

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*motor vehicles. The paper should be published after a number of corrections and clarifications have been made.*

*[14995.13] Please check that Napelenok et al used CMAQ not CAMx*

[Response] Thanks for the observation; we have corrected this error in the text.

*[14998.6] It is not plausible that motor vehicles account for 99% of total CO emissions in Mexico City. What about LPG combustion for cooking and water heating, trash burning, wood burning, house fires, charcoal, etc?*

[Response] The high percentage is not because the CO emissions from non-mobile sources are particularly small but because the CO emissions from mobile sources are very large. According to the 2004 official inventory in the city (CAM, 2006), mobile sources emitted about 1.8 Mtons of CO per year whereas area and point sources emitted about 7,200 and 5,500 tons/ year, respectively. That is the origin of the 99% estimates. Although it is a high percentage, a quick comparison with non-mobile CO emissions from other cities shows that it is not unique for Mexico City. According to the CARB emission estimates for Los Angeles (<http://www.arb.ca.gov/app/emsinv/>) for 2006, mobile, area and point sources contributed roughly with 807000, 18000, and 14000 tons/year representing 96.2%, 2.2% and 1.6%, respectively. The slightly higher percentage contribution of mobile sources in Mexico City with respect to Los Angeles is partially a reflection of the difference in age of the vehicle fleet.

*[15002.26] "an" should be "and"*

[Response] Thanks for identifying the typo.

*[15003.1] sensibility should be sensitivity*

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[Response] Thanks for the correction.

*[15003.20] a word (perhaps average?) is missing: for the peak and ozone concentrations...*

[Response] The word *average* has been added.

*[15005.5] C in eq (1) should not be subscripted*

[Response] Thanks for identifying the typo.

*[15005.17-18] difference between  $E$  and  $E''$  is not explained clearly enough*

[Response]  $E''$  denotes the differentiation of the numerical algorithm for the emission process. Note that the sensitivity method provides information on how would the model respond if the base case emissions input  $E(x,t)$  is replaced by  $E(x,t) + \lambda E''(x,t)$ . The perturbation of the base case,  $\lambda E''(x,t)$ , is performed by applying the scaling parameter  $\lambda$  to the new input  $E''(x,t)$ . This has been now indicated in the text.

*[15005.20] creaction should be reaction*

[Response] Thanks for identifying the typo.

*[15010.19] correct spelling of anthropogenic and meteorological*

[Response] Thanks for identifying these typos.

*[15011.22] omit "not equal to" symbols in numerator of eq (5)*

[Response] The symbols appear only in the pdf version of the paper we have. We will make sure the final version is fine.

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[15018.3] *Preceding should be Proceedings*

[Response] Thanks for identifying the typo.

[15019] *Excessive precision in reporting throughout Table 1. The uncertainties in emission inventories are large, it is inappropriate to report % source contributions to three significant figures such as 55.7% for CO from gasoline fleet. Even stating many of these values to the nearest percent would be optimistic in terms of level of uncertainty for the emission inventory.*

[Response] Thanks for this suggestion. We have used appropriate significant figures in the new version.

[15023] *Replot Figure 4b) in SI units instead of barrels/yr*

[Response] We have re-plotted the figure with units of liters/yr.

[15028] *Several corrections to Figure 9 caption are needed. ALK3 is mostly n-butane and isobutane, not isobutene. ALK5 cannot include pentanes as all the important ones were already listed as being part of ALK4. Correct spelling of glycolaldehyde. Also clarify whether sensitivities are semi-normalized (as implied by units of ppb in Figure 9a), or unnormalized which should be ppb per ton/day or something similar. The SAPRC99 lumped species would sort in a more obvious way (i.e. in order of atmospheric reactivity) if sensitivities were reported per unit mass of VOC emitted in each category rather than semi-normalized.*

[Response] Thanks for indicating the various corrections to the caption of this figure. We have made the corrections in the revised paper. As pointed out, the sensitivity coefficients are semi-normalized. We have decided to keep them semi-normalized

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as it is generally found in other sensitivity papers. In any event, note that from the data in Figure 9b) and Table 1 it is possible to obtain the non-normalized units of the sensitivity coefficients.

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Interactive comment on Atmos. Chem. Phys. Discuss., 8, 14991, 2008.

**ACPD**

8, S8780–S8784, 2008

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