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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Characterizing ozone production and response under different meteorological conditions in Mexico City" *by* W. Lei et al.

Anonymous Referee #1

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Review of “Characterizing ozone production and response under different meteorological conditions in Mexico City” by Lei et al for ACPD

The authors have extended their CTM calculations for Mexico City to two different categories of O3 episodes. This relatively compact paper reaches the important conclusion that all three types of episodes exhibit basin-wide VOC limited conditions. The Lagrangian analysis of P(Ox) as a function of chemical age is one of the best illustrations of the effects of emission controls on O3 production that I’ve seen. I recommend publication after minor revisions.

P 12055, line 18-20. “Cold surge .. leading to afternoon convection ... high

O3 in the city center due to stable conditions” Why the link between convection and stable conditions?

P 12058, line 12-13. “emission variations in different EI base years and locations” How was the range of adjustment factors listed in Table 1 used in the model? Was a central value chosen? Was there a spatially dependent adjustment?

P 12059, line 19 “horizontal convection” horizontal advection?

P 12059, line 5 and following. Sensitivity of predicted basin wide average O3 to a 0.5 m/s wind shift. This interesting result makes one reflect on the limits to which O3 (a basin-wide average at that) can be predicted. Fast, de Foy and colleagues have done extensive comparisons between observed and predicted wind fields. To what accuracy can wind fields generally be predicted?

P 12059 line 23-29 O3-south episode and Sunday, Easter Week emission changes Stephens et al have a paper in ACPD (8, 8357-8383, 2008) on weekday, weekend differences in O3, NOx, and CO. Their findings are in agreement with your result. Similar O3 on weekends but less CO and NOx compared with weekdays.

P 12060, line 3. I’m not sure whether 13-15 April has been previously defined (in this paper) as an O3 South episode.

P 12060, line 20. under cold surge conditions OPE values appear to be less NOx dependent This is not apparent in the Figure because of the congestion of data points (see below)

P 12060 line 27 – P 12061 line 12. Low P(Ox) in fresh air. I think all of the ingredients for an explanation are here but it is not quite spelled out. P(Ox) is proportional to Q according to Fig. 6d. The high NOx, high VOC air which has not aged, probably has a low concentration of O3, perhaps near zero due to titration. This cuts down on O3 photolysis and O3+olefins as radical sources. HCHO and other radical precursor compounds that accumulate with age can be expected to be low also.

ACPD

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Interactive Comment

P 12062 line 28 – P 12063, line 2. description of P(O3) as a function of chemical age. This is difficult to see on the graph. A box and whisker plot might be better.

Fig. 4. It would be helpful to add in the caption that these are the 2 days in which the model did not perform well.

Fig. 5 and 6 have a high density of points. The O3 South data hides the other two cases. Perhaps this will look better in a larger figure, but only if the data points stay small. Options are to reduce points by spatial averaging or by plotting every nth point. A box and whisker plot using binned data could work if there is room to display three boxes for each division of the independent variable.

Fig. 9. Caption identifies blue squares, which are green in my version.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 12053, 2008.