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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Aerosol effects on the photochemistry in Mexico City during MCMA-2006/MILAGRO campaign" *by* G. Li et al.

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General comments

In general I found the paper fairly well written and the results well-explained. Further, the methodology is sound and well-explained. The paper contains a lot of modeling work on the photochemistry of Mexico City and its relation to aerosols. The only thing I might be missing is one (preferably large) paragraph in the conclusions, summarizing and generalizing the implications of the presented work to other world megacities apart from Mexico City. I believe the presented work has such implications, and I would like to suggest to the authors to try to deliver such a paragraph, briefly discussing what the possible differences in location, climate, emission fingerprints etc. would mean in interpreting more generally the presented work.

Specific minor comments

Abstract

"aerosol size, composition and mixture": I do not understand what the authors mean by "mixture". "aerosols can slightly enhance photolysis rates": please add "at the lowermost model layer" or specify altitudes. "lead to about 2-17% surface ozone reduction": please add either "depending on time and location" or "with generally higher reductions in the early morning hours near the city center" "resulting in a further decrease of other chemical species": Please either specify the species or remove, as for some species the reductions in photolysis rates would mean slower removal rates.

Introduction

"particular matter" change to "particulate matter" "are chemical mixture" change to "are a chemical mixture" "0.63 Dobson unit" change to "0.63 Dobson units" end of 2nd paragraph: In the discussion on the impact of aerosols on photolysis frequencies please add the works of Balis et al. (2002a), Johnson et al. (2000) and Zanis et al. (2002), which, to my opinion, are very relevant. "which provides a unique opportunity" change to "which provide an opportunity". I do not agree that the opportunity for studying aerosol/photochemistry interactions is unique; other campaigns have also resulted in large datasets. "at T0 supersite" change to "at theT0 supersite" "Barnard et al. (2009)": in the reference list it is Barnard et al. (2008).

2.2 aerosol and cloud radiative module

The 48 bins of the aerosol spectrum are with a constant step? Please specify. D'Almeida et al., 1991, appears as de Almeida et al., 1991 in the reference list.

2.3 model configuration

Please briefly explain the "typical O3-convection south/north" meteorological conditions in Mexico city.

3.1 aerosol simulations

"...SOA... formed from the chemical production of gaseous precursors" change to "...SOA... formed from the atmospheric proccessing of gaseous precursors" De Foy et al., 2009, mentioned twice in the text: This is missing from the reference list. "during dry season" change to "during the dry season" "observation for nitrate" change to "observations for nitrate"

3.2 aerosol optical properties

"due to the cloud impacts" change to "due to cloudiness" "averaged in the model domain" change to "averaged over the modeling domain" "the model reasonably reproduces" change to "the model reproduces reasonably well" "in spite" change to "inspite"

3.3 aerosol impacts on photolysis frequencies

In the discussion about the vertical profiles of photolysis frequencies, the experimental and modeling works of Balis et al. (2002b) and Hofzumahaus et al (2002) are to my opinion worth mentioning here.

4 conclusions

See in general comments above.

Reference (please change to References)

De Foy et al., 2008: This reference is duplicated. Lane et al., 2008: This reference is not mentioned in the text.

Figures

Figure 5: The numbering in the x-axis in both parts of the figure is by no means optimal.

List of suggested additions to the Reference list

Balis D., C. S. Zerefos, K. Kourtidis, A.F. Bais, A. Hofzumahaus, A. Kraus, R. Schmitt, M. Blumthaler, and G.P. Gobbi, Measurements and modeling of photolysis rates during

PAUR campaign, J. Geophys. Res., 107, D18, 8138, DOI: 10.1029/2000JD000136, 12 pages, 2002a.

Balis D.S., C. S. Zerefos, K. Kourtidis, A. F. Bais, A. Hofzumahaus, A. Kraus, R. Schmitt, M. Blumthaler, and G. P. Gobbi, J.Geophys.Res., 107, 8138, doi:10.1029/2000JD000136, 2002b.

Jonson J.E., A. Kylling, T. Berntsen, I.S.A. Isaksen, C.S. Zerefos and K. Kourtidis, Chemical effects of UV fluctuations inferred from total ozone and tropospheric aerosol variations, J. Geophys. Res. 105, 14,561-14,574, 2000.

Hofzumahaus A., A. Kraus, A. Kylling, and C. S. Zerefos, J.Geophys.Res., 107, 8139, doi:10.1029/2001JD900142, 2002.

Zanis P., K. Kourtidis, B. Rappenglueck, C. Zerefos, D. Melas, D. Balis, R. Schmitt, S. Rapsomanikis, Y. Doukelis, P. Fabian and I. Isaksen, A case study on the possible link between surface ozone photochemistry and total ozone during the PAUR experiment at Crete – Comparison of observations with box model calculations, J. Geophys. Res., 107, D18, 8136, DOI: 10.1029/2000JD000137, 13 pages, 2002.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 8625, 2011.