Atmos. Chem. Phys. Discuss., 10, C636–C638, 2010
www.atmos-chem-phys-discuss.net/10/C636/2010/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Potential contribution of semi-volatile and intermediate volatility primary organic compounds to secondary organic aerosol in the Mexico City region" *by* A. Hodzic et al.

R. Ahmadov (Referee)

ravan.ahmadov@noaa.gov

Received and published: 16 March 2010

The publication presents contribution of semi-volatile and intermediate volatile organic compounds emitted by combustion processes to secondary organic aerosol (SOA) formation, its transport and further transformation in the atmosphere for the Mexico City region. Two different state of the art SOA formation mechanisms were validated in the modeling study. In addition to comparing organic particle concentrations between the model and the observations, the authors involved another constrain – O:C ratios to validate the SOA parameterizations. This approach is quite innovative and deserves attention. I recommend the paper for publication. I would like to state below my com-

ments:

General comments:

Introduction, lines 698-690: Here you talk about the strong underestimation of SOA from the "traditional" precursors, but as other authors have shown, using the more updated SOA yields and aging of anthropogenic condensable vapors can produce quite a bit of SOA (V-SOA) in the models apart from treating semivolatile POA and I-VOCs. Since the "REF" study (Hodzic, Jimenez et al. 2009) does not use such an approach, I think the authors should not strongly underestimate the role of V-SOA in predicting organic PM for the Mexico City region. A treatment of V-SOA with aging can remarkably affect O:C ratios as well, which are compared against the measurements in the paper.

The paper refers to the "REF" simulation presented in Hodzic et al. (2009) stressing that the difference in the new runs is only the treatment of the organic species. However, since the implemented "ROB" and "GRI" parameterizations involve several OH reactions, it would be interesting to state whether these reactions change somewhat OH concentrations and consequently other reactive gases.

Lines 421-423: Certainly as stated the larger nighttime errors in the model may be caused by the improper simulation of the nighttime boundary layers. But, another source of the error is the comparison of the aerosol species taken from the lowest model layer against the surface measurements, which usually are carried out at 2 m above the ground. I suggest this should be mentioned in the paper, since when the boundary layer is stable (especially during nighttime), this may lead to large uncertainties in the model-data comparisons.

Lines 495-497: Since the "worse" model skill in the prediction of the nighttime aerosol concentrations is emphasized, I suggest adding correlation coefficients only for daytime comparisons to the text as well.

Lines 735-738: As stated CO and SOA get diluted in the air in the same way, however

ACPD

10, C636–C638, 2010

the deposition (for the simulation time period, perhaps mainly dry deposition plays a role) will also change the concentrations of SOA. Hence, not only chemistry of SOA will change the SOA/dCO ratios. Please add information how the deposition processes are handled in the model.

Also, do you use dry deposition for the organic vapors? Depending on the deposition parameters for the vapors, the SOA production downwind may vary significantly.

Specific comments:

It would be useful to say little about the model settings – horizontal resolution etc. in the paper.

Line 547: Correct “which are have . . .” 637: Correct “is increased . . .”

References:

Hodzic, A., Jimenez, J. L., Madronich, S., Aiken, A. C., Bessagnet, B., Curci, G., Fast, J.,Lamarque, J.-F., Onasch, T. B., Roux, G., Schauer, J. J., Stone, E. A., and Ulbrich, I. M.: Modeling organic aerosols during MILAGRO: importance of biogenic secondary organic aerosols, Atmos. Chem. Phys., 9, 6949-6981, 2009.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 657, 2010.