

Interactive comment on “The effect of meteorological and chemical factors on the agreement between observations and predictions of fine aerosol composition in Southwestern Ontario during BAQS-Met” by M. Z. Markovic et al.

Anonymous Referee #3

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Comments: The subject is appropriate to ACP. This manuscript presents the results from an intensive, collaborative field campaign during the summer of 2007 that investigated the effects of trans-boundary pollution, local pollution, and local meteorology on regional air quality in Southwestern Ontario. The study found that the agreement between modeled and measured pNO_x at the ground site (observed mean (M_{obs}) = 0.50 μgm⁻³; modeled mean (M_{mod}) = 0.58 μgm⁻³; root mean square error (RSME)=1.27 μgm⁻³) was better than aloft (M_{obs} = 0.32 μgm⁻³; M_{mod} = 0.09 μgm⁻³;

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RSME=0.48 μgm⁻³).. It was also found that the assumption of thermodynamic equilibrium is consistent with observations of gas and particle composition at Harrow with the inorganic thermodynamics model, ISORROPIA, in an offline mode. This study is interesting. Therefore I recommend clearly the acceptance for publication of this manuscript in ACP after revisions. Several editorial comments for improving the information content and presentation of the paper are listed as follows.

1. P24782, lines 20-23: Since ISORROPIA can only be used to simulate the gas/particle partitioning between the gas phase and fine particle (PM_{2.5}) instead of PM₁ (see Yu, S. C., Dennis, R., Roselle, S., Nenes, A., Walker, J., Eder, B., Schere, K., Swall, J., and Robarge, W.: An assessment of the ability of three-dimensional air quality models with current thermodynamic equilibrium models to predict aerosol NO₃, J. Geophys. Res.-Atmos., 110,D07s13, doi:10.1029/2004jd004718, 2005), therefore, one of the biggest reasons for the poor agreement between modeled and observed values is that this study only measured PM₁ instead of PM_{2.5} chemical composition. The authors need more test this and say this in the text part.

2. P24801, lines 10-27, whole section: As I mentioned, ISORROPIA can only be used to simulate the gas/particle partitioning between the gas phase and fine particle (PM_{2.5}) instead of PM₁, and one of the biggest reasons for the poor agreement between modeled and observed values is that this study only measured PM₁ instead of PM_{2.5} chemical composition. The authors need more test about this with more sensitivities. This is the biggest concern I have about this paper.

3. Tables 1 and 2 should include other Statistical metrics like those listed in Yu, Shao-cai, Brian Eder, Robin Dennis, Shao-hang Chu, Stephen Schwartz, 2006. New unbiased symmetric metrics for evaluation of air quality models. Atmospheric Science Letter, 7, 26-34.