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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Implementation of a Markov Chain Monte Carlo Method to inorganic aerosol modeling of observations from the MCMA-2003 Campaign. Part II: Model application to the CENICA, Pedregal and Santa Ana sites" *by* F. M. San Martini et al.

Anonymous Referee #3

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Overall:

The Markov Chain Monte Carlo Method (MCMCM) was described in Part I. Here, the authors demonstrated that MCMCM is applicable at other locations. While there are many interesting observations, the analysis seems to be missing a coherent message. It would be helpful if the authors list the objectives up front. There are a couple of nagging aspects that I would like to see addressed: (1) Does MCMCM performs better

than a traditional, deterministic application of ISORROPIA using the best guess of any missing measurements? (2) A comparison of the performance of the MCMCM at different locations would be very interesting indeed, especially in light of the land use difference. The authors may also wish to review both Part I and II papers together to make sure that redundant discussions are kept to a minimum.

Detailed comments:

Abstract.

(1) The model accurately predicts aerosol phase observations with one exception. Can you comment on the reason why model performance is less satisfactory for that one time period?

(2) Please comment on the range of HCl concentrations that would be obtained if MCMCM is not used (i.e., from the application of ISORROPIA using nominal values).

(3) In the abstract, it is better to state what the indicators properties of HCl are.

Experimental.

How are negative observations treated?

Results.

(1) If 97% of the analysis with MCMCM produce NH3 results within measurement uncertainty, what is the value added for this species? Why not just use the measurements?

(2) Of the 31 points outside the measurement uncertainty, what are the potential reasons for the disagreement? Are the MCMCM estimates more reliable in those cases? Are there any evidence of non-equilibrium conditions or larger-than-normal measurement errors that can support such an interpretation?

(3) In cases where the predictions are sensitive to assumptions of stable vs. metastable

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aerosols, it could be useful to point out what measurements in Rood et al. (1989) that would help evaluate the state of the aerosol.

(4) That the availability of NH3 data is helpful in reducing the uncertainties of estimated HCl concentrations is a useful conclusion that should be highlighted in the abstract.

(5) Please provide an idea of what the prevalent pH range is in contrast to the 9-11 April period.

(6) For Pedregal and Santa Ana, please list how many points are analyzed and how many of the NH3 predictions are within measurement error.

Discussion

Can the AMS measurements be used to verify the discussions regarding SOA?

The upper limit estimate of the importance of Cl reactions (2%) seems inconsistent with the conclusion that direct HCl observations are important. Is it because the upper end limit is “on the verge of being relevant”? Some elaboration of the discussion is needed.

Editorial comments:

p. 6002, line 29. “needed”Ĕ

p. 6003, line 12. missing period at the end of paragraph

p 6006, line 13. missing comma between two Greek letters describing the normal distribution

p 6011, line29. capitalize “C” in “HCl”

Figure 1. What do the contours, pink line, and shaded area represent?

Figure 2. Are the predictions HNO3 or NOz?

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 5999, 2006.

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Interactive Comment