

Interactive comment on “Trans-Pacific transport and evolution of aerosols and trace gases from Asia during the INTEX-B field campaign” by B. Adhikary et al.

Anonymous Referee #2

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General comments

This paper presents a detailed evaluation of the STEM model simulations with air-borne and ground-based measurements obtained from the INTEX-B campaign. I feel this paper is strong in description but much need to be improved in analysis. Many discussions in the present paper are subjective and incomplete, and the authors often randomly move from one point to another point without building a clear connection. I would recommend publishing this paper in ACP only if the authors thoroughly revise the manuscript and present the scientific results in a more clear, concise, and well structured way.

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Specific comments

1. I am not fully convinced that the overprediction of PAN is simply due to uncertainties in emission estimates and boundary conditions. I believe this is something more closely related with the SAPRC99 chemical mechanism used for gas-phase reactions in STEM. More PAN analogues are considered in SAPRC99 than other carbon-bond schemes. Did you compare the sum of all PAN analogues in SAPRC99 with the observations? Is this consistent with the observed PAN species during INTEX-B? I suggest the authors to check previous studies evaluating PAN predictions in other regional models (e.g., CMAQ) using the SAPRC99 scheme with aircraft measurements.
2. Discussion on Figure 2a and Figure 5a: The authors need to bring more convincing evidence supporting the statements that CO and O₃ at higher latitudes are due to European inflow.
3. Discussion on Fig.12c (Page 16401, line 20-25): The authors stated that "The model is able to capture the magnitude and variation of measured CO at Mt. Bachelor". However, there are a few episodes that the model predicts elevated CO while the observations show decreasing CO. In addition, can you elaborate what happened during April 16-21?
4. Throughout the manuscript, when discussing emission uncertainties, please be clear which emission inventory you are referring to. For example, page 16397, line 1, SO₂ emissions may be too low in Asian or NEI emissions? Since most C130 flights were operated in the coastal regions of western US, I think uncertainties and possible errors in the NEI data may play an important role. The authors stated in the manuscript a couple of times that they were using NEI2001 instead of NEI1999. Can you provide quantitative information on how much difference between these two inventories?
5. Page 16396, discussion on Fig.9: The authors stated that "The model fail to capture the elevated sulfate levels above 2km that were observed by the C-130". Does the model fail to capture the plume transported or the production of sulfate in the plume?

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The elevated sulfate is due to transpacific transport or originates from surface sources in the western US?

6. Page 16388, line 1: The ozone column data from OMI are climatological mean or dynamic data for the INTEX-B period?

7. Page 16393, line 8-10 (Figure 5a): Ozone hotspots appear in central Japan as well.

Technical corrections

1. Much work needed to improve the quality of most figures included in this manuscript. All sub-figures should be labeled by a,b,c ..., not just in the captions. Fonts are too small for many figures, which make the readers very difficult to see them.

2. The manuscript needs to be checked for English grammatical errors. Some of them are listed below. page 16386, line 5, 3 dimensional → three-dimensional? page 16386, line 8, in the recent past → in the recent decade? page 16386, line 18-19, delete "(Tang et al.,2003)" at the end of the sentence? page 16387, line 2, ageing → aging? page 16387, line 6, we used → used?

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 16381, 2009.