Atmos. Chem. Phys. Discuss., 7, S3225–S3227, 2007
www.atmos-chem-phys-discuss.net/7/S3225/2007/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "The Coupled Aerosol and Tracer Transport model to the Brazilian developments on the Regional Atmospheric Modeling System (CATT-BRAMS) – Part1: Model description and evaluation" *by* S. R. Freitas et al.

Anonymous Referee #1

Received and published: 18 July 2007

The authors implement an aerosol and tracer transport model in a regional atmospheric modeling system. The authors then apply this online tracer transport model to examine aerosol (PM2.5) and CO distributions over South America and compare the simulated results to corresponding measurements from satellite, aircraft, and in-situ for evaluation. Overall, the paper shows fairly detailed evaluations with the measurements and some interesting results were found. However, I think there are many areas that need clarifications or further analyses. I suggest the authors address the following major comments before the paper is considered for publication in ACP.

General Remarks:

1. It is difficult to extract the primary objective of the manuscript. The authors' ideas are interspersed into two topics; the regional Atmospheric Modeling System (BRAMS) and the tracer transport model (CATT). However the feedbacks which link the two parts (i.e. the "coupled" effects) are missing. For example, the authors devote a lot of effort in discussing the processes of BRAMS and evaluating the meteorological fields it simulates. However, there is no in depth discussion of how these processes and fields impact tracer simulations. On the other hand, the feedback of aerosol simulation on meteorological fields through radiation parameterization used in BRAMS is also not explored.

2. It is still unclear which improvements (e.g. new convection parameterization, land use information, and soil type) in BRAMS are new features developed by this work and which were presented in previous studies but benefit the current study.

3. The authors indicated in the abstract that sources of tracer gases and aerosol particles contain the emissions from biomass burning and urban-industrial-vehicular activities. However, I observed that only biomass burning emission is considered in the study for both CO and PM2.5. How about other emissions, such as emissions from fossil fuel, biofuel, and biogenic for CO? How about CO chemistry production from CH4 oxidation? Are these other sources neglected because they are unimportant in comparison to biomass burning emission? If only biomass burning emission is considered in the study, the authors should give at least a rough estimation of the potential uncertainty due to neglecting the other sources.

Specific comments:

1. Page 8527 line 10-12 (abstract): Which aerosol data was used in radiation parameterization? Is it the one produced by the simulation of this study?

2. The introduction is somewhat weak. I suggest augmenting it by highlighting the new

ACPD

7, S3225–S3227, 2007

features of the model and the objectives of this study.

3. Page 8530 line 16-17 and page 8531 line 22-26 (model description): How about other types of emissions? How to treat PM2.5 in the model? Please clarify whether the study differentiates aerosol composition for PM2.5 in simulation. How does the model treat dry and wet depositions for PM2.5?

4. Page 8530 last line: Fine mode aerosol usually refers to particles with a radius of less than 0.5μm.

5. Page 8533 line 9: What is CPTEC? Does CPTEC T126 provide initial field for CO and aerosols?

6. Page 8533: Very clear and detailed descriptions for land surface data over South America. However, the link of this data to CO and aerosol surface fluxes in this study is missing. How does land surface situation influence CO and aerosol emissions studied in the paper?

7. Page 8534 line 1-9: The authors indicate here again that only biomass burning emission is considered in the study.

8. Page 8539 line 22-23: Please elaborate on the sentence “The diurnal evolution of the boundary layer contributes to this high variability.”

9. Page 8541 line 21-22: How to perform the condition of ‘using retrievals with $<$ 50% a priori contribution’.

10. Page 8555 figure 4: Change AUG/SEP/OCT to percent persistence.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 8525, 2007.

ACPD

7, S3225–S3227, 2007