Atmos. Chem. Phys. Discuss., 10, C3341–C3343, 2010
www.atmos-chem-phys-discuss.net/10/C3341/2010/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Technical Note: Evaluation of the WRF-Chem "aerosol chemical to aerosol optical properties" module using data from the MILAGRO campaign" *by* J. C. Barnard et al.

Anonymous Referee #1

Received and published: 29 May 2010

General Comments:

This paper provides an important evaluation of a specific WRF-Chem module used to characterize the optical properties of aerosols. The module is isolated from the larger WRF model and evaluated by replacing modeled aerosol levels with measured levels. The results showed the module accurately represented hourly B_{abs} and ω but failed to accurately represent hourly B_{scat}. Averaged over a longer period, module outputs of B_{scat} and ω matched observed values. A significant difference was found between predicted and measured B_{abs} when averaged over the dry period. The results also

demonstrate that the discrepancy between the full modeling predictions of ω and the observed values of ω could be largely attributed to the emission inventory. A detailed discussion of uncertainties is included.

Although the implications of these results are a bit limited by the short experimental time period and the single experimental location, the paper is well written, focused, and provides information that will be useful for WRF-Chem users and will help guide model development efforts.

I recommend this paper for publication, however the paper could be improved by providing additional context concerning the optical module and by expanding the discussion of the implications of the findings. See specific comments below.

Specific Comments:

Introduction: If the authors are aware of similar evaluation efforts of other modules used within WRF-Chem or WRF it would helpful to reference these papers.

Introduction and Section 2.1: It would be useful for many readers to provide more information about the particular module evaluated here. Is there a reference specifically for the module? There is a choice of optical modules available in WRF-chem, correct? Which optical module is used here? Would the results here be applicable to any of the other optical modules? What about the choice of chemical/aerosol modules, if a different chem/aerosol module were chosen, would the results here be relevant?

Section 2.1 and 2.2: Both the modeled and measured aerosols were treated as dry. How relevant is this study to module performance in regions with high humidity?

P 8936, lines 12-15: Clarify what are the 'major complications' from dust.

Conclusion, p 8947, lines 23-25: Here you state the module may be useful for climate simulations. Does this mean the module will be useful as part of the prediction of radiative aerosol forcing? Is the discrepancy between observed and modeled B_{abs} during the clear sky period of concern to larger climate models? If available, some

context as to the relative sensitivity of radiative aerosol forcing to the optical properties investigated here would be helpful.

Figure 1 and 6: By starting the vertical axis at 0.4 you have maximized the visual impact of the difference between the model output and the observed values. Starting the vertical axis at 0.0 would provide the reader a more intuitive visual indication of the magnitude of differences between modeled and observed values.

Technical Comments:

Figure 5: The figure caption should read instead: "The top panel shows the absorption coefficient, B_{abs}, ... bottom panel ... scattering coefficient, B_{scat}..."

Page 8946, line 11. "The reasons for this behavior are not understood..." Please specify what "this behavior" refers to.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 8927, 2010.