

Interactive comment on “Characterising Brazilian biomass burning emissions using WRF-Chem with MOSAIC sectional aerosol” by S. Archer-Nicholls et al.

Anonymous Referee #3

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General Comments This paper attempts to evaluate the Brazilian Biomass Burning Emissions Model (3BEM) using a state-of-the-art regional chemistry transport model WRF-Chem and extensive observations collected during South American Biomass Burning Analysis (SAMBBA) field campaign. The authors find that WRF-Chem significantly overestimates aerosol concentrations in the middle troposphere and attribute this discrepancy to uncertainties in plume-rise parameterization. Authors modify 3BEM fire emission estimates based on activity fire size and burned area for 2012 fire season and show that modified emissions produce on average a more reasonable injection height but there is still a strong bias towards overestimating the injection height. Authors had to increase fire emission estimate also from 1.3 to 5 to retain reasonable AOD

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indicating that challenges associated with modeling of fire emissions. Further, authors find that WRF-Chem shows better agreement with observations in some places while overestimates in some other places indicating the scope of improvement in WRF-Chem as well. The paper is well written and easy to understand. The paper is suitable for publication in GMD. Most of the concerns have already been raised already by the two reviewers and I have only a few technical comments listed below.

Specific comments: Page 6069: Line 10: I believe that SOA contribute to aerosol radiation interaction in WRF-Chem. Please check. Page 6069, Line 20: Change “efficiently” to “efficient”. Page 6069: It is always a good practice to number Tables and Figures in ascending order. Here Table 2 comes before Table 1. Similarly, Table 5 comes before Table 4 at Page 6082, Line 12 Please revise. Page 6086, Line 5-6: Did you try to look up MISR plume heights for South America? Page 6089, Lines 10-16: Please give some statistics to quantify the model performance. For example, average and standard deviation Of AODs, spatial correlation coefficient and mean bias would help. Page 6088, Line 24: I guess you mean combined Terra and Aqua. Figure 3, caption: I think b and d are for WRF-Chem, not b and c. Figure 4, caption: Do you mean light instead of Bight? Figure 5, caption: change agains to against.

Interactive comment on Geosci. Model Dev. Discuss., 7, 6061, 2014.

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