

Interactive comment on “Long-term simulations (2001–2006) of biomass burning and mineral dust optical properties over West Africa: comparisons with new satellite retrievals” by F. Malavelle et al.

Anonymous Referee #2

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GENERAL: This paper evaluated simulated aerosol optical depth, single scattering albedo, and angstrom exponent from RegCM with ground-based measurements and satellite retrievals. The paper has following problems that need authors to do some improvements on both the model and the work, and are not suitable for the publication in “Atmospheric Chemistry and Physics” in the current version as a result.

First, the paper has little scientific contributions. A model evaluation work is not suitable for the publication in ACP, unless the model works as a tool to interpret observed relationships or processes. For example, in Lines 9-13 Page 28605, the author said “To some extent the SSA values observed over the gulf of Guinea can be interpreted as

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a mixture dominated by fine dust aerosols that are more scattering (high SSA \sim 0.98-0.99 at 550 nm, Osborne et al., 2008) than the coarser dust aerosols (McConnell et al., 2008) less efficiently advected toward long distances (Maring et al., 2003)”. Why not analyze results from RegCM instead of citing other references? There are many similar sentences in the paper and the authors can improve the scientific strength of the work by connecting problems with their model results.

Second, the evaluation of model is incorrect and incomplete. The authors utilized three different sets of satellite data on the purpose of a comprehensive comparison. However, these datasets have different time span and can not compare to each other directly. In addition, the authors only evaluate the long-term mean of the simulation with observations. They should also validate simulated interannual variability.

Third, the model parameters may be incorrect. The authors do not mention how they obtain the extinction coefficient. Theoretically, these parameters are calculated with Mie program, which does not show too large difference in K_{ext} between 440 nm and 670 nm for dust as shown in Table 1 (e.g. Takemura et al. 2002, or some default settings in climate models, such as CAM3). The incorrect parameters may also explain why the simulated AE is negative while observations give positive values.

At last, the English is not concise. There are many misuses and redundance in the paper, especially the introduction section. The authors need to have the paper read by native English speakers.

SPECIFIC: Following are some specific problems in the paper. However, they are not the complete ones.

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Line 7: AERONET/PHOTON. Abbreviations should be explained when they first appear in the paper. Similar problems for MODIS, MISR, OMI, RegCM, SSA, ERA, PARASOL, AMMA-SOP0, bbAMMA, SAFARI2000, and so on.

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Line 10: Why do you use AOD in Abstract while the whole paper uses AOT?

Please add some quantified results to the Abstract.

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Line 2: What's the difference between "local" and "regional"?

Paragraph 3: This paragraph introduces the climatic effects of dust and BC/OC. However, the whole study does not discuss any direct or indirect effects of these aerosols. Please make your introduction concise and relevant.

Line 12: Abbreviation of AOT has been explained before.

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Line 10: You neither mention sulfate in the introduction nor do any analyses about it.

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Lines 14-15: Do you have any idea why AEAOT is larger for carbonaceous aerosols while AEAAOT is smaller for them relative to dust aerosols.

Page 28598

Lines 3-5: "possibly due to ..." Do you have any support for your explanation? It's too casual to say the conclusion.

Lines 11-12: "... appears clearly" You do not give any simulated AOT or concentrations of dust and BC/OC separately, and the readers won't understand why it is "clear" that BC/OC dominate aerosol mixture. Please show more detailed results from RegCM.

Page 28601

Line 22: "... higher than ... literature". Please give some references

Page 28603

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Lines 8-9: "The satellite under-sampling ..." What's the meaning of this sentence?

Page 28609

Line 15: "Compared to ..." I believe many other models can also simulate carbonaceous aerosols.

Figure 2:

Why the MODIS SSA has so many missing values while its AOT does not?

Figure 4:

It seems that Figure 4e is the same as Figure 3c.

Figure 5:

Why AAE and AE are negatively correlated?

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