Atmospheric
Chemistry
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Discussions

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Interactive comment on "**Direct and semi-direct radiative forcing of biomass burning aerosols over the Southeast Atlantic (SEA) and its sensitivity to absorbing properties: a regional climate modeling study**" *by* **Marc Mallet et al.**

Anonymous Referee #1

Received and published: 5 August 2020

This is a very interesting and important study topic. The manuscript described regional climate models simulation of biomass burning aerosol over southeast Atlantic, which draws very few attention in the literature but may have important influence due to the persistent intensive emission from South America. The modeling approach is reasonably, with solid validations and in-depth discussion of the result. The sensitivity simulations with different absorbing properties provided upper boundary estimates of the direct and semi-direct effect of aerosol. This is a well-organized study with fluent professional writing. Therefore I would recommend this manuscript to be accepted with

very minor revisions, following are some detailed comments.

Comment#1: The spatial distribution figures have very low DPI (although the information could be read), please make them more clear. Also, some figures have national boundaries but some don't, please keep it consistent. The curve figures have lines too slim, please consider make them bolder.

Comment#2: Line#23: Unnecessary to sate "the approach of using two ... of the results"

Comment#3: Line#35: the subsidence of air mass, water vapor, etc? please rephrase to be more clear

Comment#4: Line#36: so what is the overall semi-direct effect?

Comment#5: Line#39: "the results indicate ... to the absorbing properties of BBA" this is certainly true, please make more specific statement of the innovative finding from this study

Comment#6: Table 1. Horizontal resolution: 12km, 80km

Comment#7: Line#134: "In ALADIN-Climat ..." I don't understand this sentence, do you mean the boundary conditions were derived from simulations for a larger domain with biomass burning emission?

Comment#8: Line#189: Does CTL include direct and semi-direct effect of other aerosols?

Comment#9: Line#199: GFED gives fire emission as "dry matter" or "total carbon", what's the emission factors used to calculate aerosol emission?

Comment#10: Line#202 and section2.1.3: I am confused here, section2.1.3 mentioned BBA is treated as one type of aerosol in the model, so why the emission is upscaled for BC and OC separately?

Comment#11: Line#203: need reference for the scaling factor

Comment#12: Line#215: Raw GFED has 3-hour intervals.

Comment#13: Line#303: this section mainly described model evaluation of LCF, no detailed discussion was made regarding microphysical properties

Comment#14: section3.3.1: why AOD simulation bias is bigger in certain months, such as Jan-Apr and Sep-Dec; what's the correlation coefficient between simulation and satellite, with raw monthly data intervals?

Comment#15: Line#381-387: please provide more details to demonstrate the plume rise of biomass burning in the two models because it decides if BBA will get above or below cloud.

Comment#16: Fig5. The two model simulated different change of ACAOD from 2008 to 2009, please explain why

Comment#17: Line#446: prescribed SST can also be altered by the aerosol effect?

Comment#18: Fig.8: RegCM legend is vertical

Comment#19: Fig.11: why there are missing values?

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