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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Modeling the smoky troposphere of the southeast Atlantic: a comparison to ORACLES airborne observations from September of 2016" *by* Yohei Shinozuka et al.

Anonymous Referee #1

Received and published: 15 November 2019

The authors present a detailed study of the ability of a collection of models to reproduce the in-situ and remotely sensed properties of the biomass burning plume obtained as part of the ORACLES 2016 campaign over the southeast Atlantic. They show that the campaign sampled a relatively representative portion of the plume in space and time. They find that the models tend to underestimate the height of both the base and the top of the plume against these observations, and that most models underestimate the mass extinction efficiency within the plume.

While the paper is well written and comprehensive in its analysis I feel the results need to be put into a broader context and include deeper interpretation for it to fall within

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Discussion paper

the scope of ACP. For example, it isn't clear what the implications of the highlighted biases are in the, fairly arbitrary, selection of models chosen. The summary is missing an assessment of the impact of the underprediction of the modelled plume heights on e.g. the local aerosol forcing through direct and semi-direct effects. This could be linked to recent work by Gordon et al. 2018 more closely, especially as the same model was used. The paper would also greatly benefit from a clearer focus to help guide the results section which becomes quite hard to follow otherwise. In particular, the link between the biases in the aerosol microphysical and optical properties isn't elucidated until the discussion. Even then I feel the discussion isn't placed in sufficient context: There is a large amount of diversity in model estimates of the absorptivity of the plume in the literature and the comparisons here could go a long way to unpicking this.

Other, more minor comments and suggestions are provided in the attached PDF.

Please also note the supplement to this comment:
https://www.atmos-chem-phys-discuss.net/acp-2019-678/acp-2019-678-RC1-supplement.pdf

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