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Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2022-160

Anonymous Referee #1

Referee comment on "Seasonal variations in fire conditions are important drivers in the trend of aerosol optical properties over the south-eastern Atlantic" by Haochi Che et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2022-160-RC1, 2022

Review of "Seasonal variations in fire conditions are important drivers to the trend of aerosol optical properties over the south-eastern Atlantic"

Che et al. investigated the effects of seasonal biomass burning in south central Africa on optical properties observed downwind at Ascension Island using observations from the LASIC campaign during two biomass burning seasons (June – October 2016, 2017). The authors leveraged the comprehensive set of LASIC optical measurements in combination with satellite products and reanalysis to show that changes in cloud processing, fuel source and type, and regional circulation influence the absorbance properties of the aerosol that reach Ascension Island. The paper highlights that the observations show a much more absorbing Southeast Atlantic boundary layer than is simulated by most climate models. This is an exceptionally thorough and convincing paper that is well written and presented. I only have a few minor comments that need to be addressed.

Minor Comments:

Line 57: add "the"; "during [the] CLARIFY (…) campaign"

Line 127: (Pennypacker et al., 2020) described an Ascension Island biomass burning background BC median concentration of 20 ng m-3 (ultra clean median of 51 ng m-3) with some monthly variability during the LASIC campaign. Was this/these value(s) also considered for the background calculation of BC/dCO as was done for dCO? If not, can you speak to how you think these might impact the calculation and subsequent interpretation of results?

Line 208: delete "the"; "the July-September averaged MACBC measured in 2016 on [the]

ASI”

Line 235: change “consisting” to “consistent”

Meteorological factors (Section 4.3.2): Although this section discuss the impact of winds on combustion conditions, the authors should also make note of the effects of the Southern African easterly jet and it’s potential influence on the seasonal optical properties at Ascension. Specifically, (Adebiyi and Zuidema, 2018) described a peak in the AEJ-S during the September – October period when the transport of BB aerosol can be very efficient. Were jet-level winds/trajectories (~600 hPa) also examined as a part of this study?

References

Adebiyi, A. and Zuidema, P.: Low Cloud Cover Sensitivity to Biomass-Burning Aerosols and Meteorology over the Southeast Atlantic, Journal of Climate, 31, 4329-4346, 10.1175/JCLI-D-17-0406.1, 2018.

Pennypacker, S., Diamond, M., and Wood, R.: Ultra-clean and smoky marine boundary layers frequently occur in the same season over the southeast Atlantic, Atmospheric Chemistry and Physics, 20, 2341-2351, 10.5194/acp-20-2341-2020, 2020.