Atmospheric Measurement Techniques Discussions

Atmos. Meas. Tech. Discuss., referee comment RC1
https://doi.org/10.5194/amt-2021-151-RC1, 2021

Comment on amt-2021-151

Anonymous Referee #2

Referee comment on "Inferring the absorption properties of organic aerosol in Siberian biomass burning plumes from remote optical observations" by Igor B. Konovalov et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-151-RC1, 2021

This study extends previous AAE-based approaches to estimate the BrC contribution to absorption measurements by adding an SSA constraint. This approach can also be used to estimate additional "unobservable" properties (e.g. BC:OA). The authors apply this approach to biomass burning plumes measured at two AERONET sites in Siberia. The methods are clearly described and provide a useful advance in extracting information about BrC from AERONET observations.

Minor comments:

- Strongly suggest edit title to read "in Siberian biomass burning" given that the methods were developed using Siberian relevant parameter ranges and applied to AERONET observations in this region.
- Line 176: How uncertain is the wavelength dependence? how would this impact the results (e.g. if you used the wavelength dependence of McClure et al., 2020 instead)?
- Lines 203-206: Did the authors consider showing plots of the PDFs of parameters? This might be a useful visual to demonstrate adequate sampling of values.
- Line 184: What fraction of the distribution was removed due to truncation?
- Line 220: Could you comment on whether statistical independence is a good assumption for the parameters used here?
- Lines 258-263: The authors might consider discussing the implication of using only Level 2 data on the general application of this method in the Conclusions, i.e. skewed sampling of high AOD, and whether this would limit BrC estimated using this approach to near-source and perhaps not be appropriate for constraining photochemical aging in Siberia or other regions of the world.
- Line 305: RH values in Figure 1 seem to go up to 80%. Please correct the text with this value or modify phrasing to say that values generally range between 40 and 70%

- Lines 327-329: Missing definition of sigma3
- Figure 2: The legend or caption should clearly state which BC:OA corresponds to open/filled points.