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Atmospheric Measurement Techniques Discussions

Interactive comment on "Laboratory Validation and Field Deployment of a Compact Single-Scattering Albedo (SSA) Monitor" *by* Julia Perim de Faria et al.

Anonymous Referee #2

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The comments and suggestions from this reviewer are attached as an uploaded pdf file.

I think there is merit to the work, but it is not ready for publication in its present form.

REVIEW NOTES and comments: Laboratory Validation and Field Deployment of a Compact Single-Scattering (SSA) Albedo Monitor Journal: AMT Title: Laboratory Validation and Field Deployment of a Compact Single-Scattering Albedo (SSA) Monitor Author(s): Julia Perim de Faria et al. MS No.: amt-2019-146 MS Type: Research article Matrix Scores: Criteria: Scientific Significance – Good 2 Scientific Quality – Fair 4 Presentation Quality - Fair Over all English language presentation: There is a

general non-standard usage of comma separators, and a few general awkward English syntax constructions. However, it seems most intended meanings are clear. The paper could use revision of grammatical and syntactical usage to make the reading flow more smoothly. Over all Scientific Presentation: General lack of the definition and standard used for the terms accuracy and precision. There should be at least an equation presented for the calculation assumed in each measure. It is important as the system of closure for the complete instrumental experimental circuit depends not only upon the accuracy and precision of each individual instrument, but the data path through all of them. The study could be enhanced by a true presentation of error propagation by classical form differential error analysis. The assumption of normally [Gaussian} distributed error seems perhaps unfounded in such a complicated closure strategy. The work has merit and should be published conditional upon appropriate revisions and additions. Specifics: Table1: the mixture of AS+AD is assumed to have an SSA λ=630nm of 0.6 for the study case, but lacks details in discussion of how the mixture of the standard substances was to be controlled. Lines 100 – 105: Perhaps some calibration data could be presented, as well as plot of Scattering Channel signal vs. Extinction Channel signal. This could provide insight into baseline fluctuations and possible instrumental bias. Section 2.1.2 Lines 115 -120 "The instrument measures....." Section 2.1.3 CAPS PMext configuration It might be beneficial to include a figure as nicely detailed as that of Figure 2. For the CAPS PMssa configuration. Lines 140-145 One of the unique features of the CAPS PMssa set-up is the integrating sphere. The glass tube that passes through the sphere needs a bit more detailed information as it is inside the integrator. Some specifics as to the thickness of the wall, any coating it may have, it's optical properties should be characterized or listed somewhere from the manufacturer or supplier - if not determined during calibration of the instrument itself. [A general Question: Were any other wavelengths considered or tested for the calibration standard?] Section 3 discussion: Some of the sentences could be divided into shorter more clear constructions Lines 210 – 215: 1) I think these critical figures could be sized up a bit 2) There seems to be a general assumption that the standard

deviation is the most reliable measure of experimental uncertainty. This reviewer is not sure this is a completely valid assumption. 3) The reference to PSAP-NEPH extinction measurements being similar to those of Petzold 2013: this unfortunately requires the reader to find the other paper to validate this statement of event or know what the expected result was. A simple sentence could clarify this. [Yes, as one of the contributing authors it is perfectly acceptable to cite their own previous research articles, but perhaps a bit much to expect the reader of this article to be familiar with the result of that work.] Section 3.2 Line 217: " There is no systematic error found neither in the average nor in the standard deviation of the measured values." Although the internal reference is to a table included in the supplemental material, it is a mathematically unsupported assertion. A calculation or insight into how this statement is evidenced might make a stronger case for its inclusion. Section 3.3 Figure10: is problematic on multiple levels: although the notion of overlying timeseries into a single track representing the CAPS PMssa and PSAP for the three type of aerosol particles testing is a good idea, the diagram has flaws. [same comments apply to Figure 7 on the scattering channe;] 1) The figures do not expand into full size charts and are presented TOO SMALL to intuit any scientific sense from their visual examination. [This may be a display result after the Copernicus online system was revamped for their paper display] But the authors could simple make a much larger figure. 2) The horizontal axis has numbers on a scale with no mention or label as to their units. Are they "seconds" after the calibration sequence has finished? Are they minutes? 3) Even if the individual axis numbers align, there is not a mention to assure the reader they were simultaneously measured. 4) These figures as a set need to be amplified in the vertical scale so as to make visible Any regions in time where the CAPS PMssa signal fluctuations and spikes might not be synchronous to those of the supposed time coincident signal of the PSAP. 5) Expanding the horizontal time axes will allow the reader to view regions where the signals might not be precisely time correlated and any instrumental fluctuations as "noise." Discussion of this diagram is not complete. No mention is made to the significance of the regions where the traces converge over

time to a common point in the AD and BC examples. No mention of the significance, if any, of time intervals where the signals step down, or step-up in sigma (σ). NOTE: as mentioned prior it is not sufficient to cite a method "data correction" (Ogren 2010) without explaining why it is appropriate in this situation and how it fundamentally treats the data. Forcing the reader to find another paper to understand what is going on in this paper is not exercising good scientific communication skill. There is nothing wrong with the citation of Ogren 2010, simply the authors here should explain how and why is it used, as well as it's importance to the data collected in this research. It should also be noted that without a time series analysis proper [lag correlation, etc. as an example] there is not a reliable method to indicate how the static correlation coefficients presented in the table evolve over time as the instruments run. Correlation coefficients are important as measures, but should state clearly they might not reveal complex interrelationships between data signals as the instruments run over time. Section 3.4 This is the key portion of the research and should be strongly emphasized. Generally well done. Line 281: does the statement "....expected values for each aerosol type" directly refer to table 1? If so, reiterate that. If not, please summarize the expected values directly here. THIS IS ENOUGH TO WORK ON FOR now

Please also note the supplement to this comment:
https://www.atmos-meas-tech-discuss.net/amt-2019-146/amt-2019-146-RC2-supplement.pdf

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