

# ***Interactive comment on “AEROCOM/AEROSAT AAOT SSA study, part I: evaluation and intercomparison of satellite measurements” by Nick Schutgens et al.***

## **Anonymous Referee #1**

Received and published: 30 December 2020

Review of Schutgens et al "AEROCOM/AEROSAT AAOT & SSA study, part I: evaluation and intercomparison of satellite measurements"

This paper provides an assessment of column absorbing aerosol properties from satellite observations in the context of AERONET observations with the goal of determining whether such observations are of the quality suitable for model evaluation. The paper is clear and well written and interesting.

Because of the clarity of the prose, tiny phrasing and grammatical issues were more apparent. Most of the comments below relate to suggestions for improving those, with a few very minor comments/questions thrown in. Nice paper - I enjoyed reading it.

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Line 7 - Abstract - "2) their application to the evaluation of AEROCOM models." Should make a little clearer that no models were used in this paper. The first paragraph of the abstract does that but then this sentence muddies the waters.

Line 2 (and line 56) "several satellite products of AAOD have appeared" maybe change 'have appeared' to 'have been developed'?

Line 4 (also line 91) "super-observations" are they super because aggregated to 1x1x30min?

Line 33 "The species that absorb most visible sunlight" change to "The species that absorb the most visible sunlight"

Line 38-29 "In particular over bright surfaces (ice, deserts, clouds) can the forcing due to absorbing aerosol be significant" change to "In particular over bright surfaces (ice, deserts, clouds) the forcing due to absorbing aerosol can be significant"

Line 41 "black carbon may affect the Hadley cell" affect how or what - Hadley cell circulation?

Line 44 "absorptive aerosol" I prefer 'absorbing aerosol', but I'm not sure if there's official agreement on this!

Line 47-50 - Could cite Laj et al. AMT, <https://amt.copernicus.org/articles/13/4353/2020/>, 2020 for these global surface absorption measurements. They present a review of the available data.

Line 50 "Moreover, these are surface measurements." This is true, but perhaps should state why this is a problem? Surface insitu measurements do have advantages over AERONET and satellite retrievals in that they operate continuously (day/night regardless of clouds) and are less limited by loading requirements. They are definitely sparse though!

Line 64 "error prone" is it that they are more error prone or just more uncertain? (I'm

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not a stats person so not sure those are the same or different!)

Line 62-70 perhaps comment on whether anything is known (or not) about bias in AERONET retrievals of AAOD/SSA rather than just on uncertainty in the retrievals?

Line 72 "AERONET hardly covers" change to "AERONET only sparsely covers" or something like that.

Line 84 "observational model datasets" change to "observational datasets"?

Line 90 is 'L2' defined or a well-enough known abbreviation? later, on line 103, it's spelled out as level 2.

Line 96 therefor → therefore

Line 101 should 'MOC' be defined (and FL-MOC)? Also section header is 'FL-MOC' but the text in this section just uses 'MOC' but later in figures and text it's referred to as FL-MOC.

Line 132 'provided' instead of 'provides'?

Line 140 "also the fraction of spheres is included in the" change to: "the fraction of spheres is also included in the"

Line 144 define BRDF?

Line 156 "Aerosol is assumed an" change to "Aerosol is assumed to be an"

Line 157 "aerosol components and are retrieved" change to "aerosol components which are retrieved"

Line 158 define BPDF?

Line 158 "The aerosol is assumed a mixture" change to "The aerosol is assumed to be a mixture"

Line 192 "Andrews et al. (2017) only had observations over two sites" Andrews 2017

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did include comparisons of insitu flight profiles from other sites in addition to the two main sites they studied.

Line 231 change '&' → 'and'

Line 242 add comma after 'i.e.' also after 'e.g.' on various lines (question for editor?)

Line 275 "Rocky mountains" change to "Rocky Mountains"

Line 280 "The impact of AOD will later be discussed." change to "The impact of AOD will be discussed later."

Line 284 extra space before the word 'which' in parentheses

Line 316 "observations and was" change to "observations and so it was"

Line 324 "underestimate AOD and AAOD" change to "underestimate AERONET AOD and AAOD"

Line 324 "amount in case" change to "amount in the case"

Line 326 product → products

Line 347 "have hard cut-off" change to "have a hard SSA cut-off"

Line 350 put '2019a' in parentheses

Line 360 "corollary" check spelling - only 1 r? i.e., corollary

Line 370 "satellite SSA still" change to "satellite SSA values still"

Line 386 put 'in general' in commas: ', in general, '

Line 402 "and use them to evaluate AEROCOM models" This line in the conclusions suggests that AEROCOM models are used in this paper. Perhaps rephrase and say "in preparation for evaluation of AEROCOM models" instead?

Line 409 "could suggests" change to "could suggest"

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Line 410 "to obtain best" change to "to obtain the best"

Line 416 In conclusions refer to 'AQUA dark target', but in text refer to AQUA-DT. Perhaps be consistent?

The appendix is weirdly interspersed with the figures.

Line 722 "observations of AOD" but then in next sentence require AOD and AAOD. Should it be "observations of AOD and AAOD"?

Line 727 (and 733) "(here 30min x 1 x 1) exceeds" in the main text use format "1 x 1 x 30 min" make consistent, i.e., length x length x time or time x length x length

Line 735 "MAN data" It makes me laugh to ask, but what is MAN data? do you mean SAT data?

Throughout the text, the words 'criterion' and 'criterium' are used. I'm not 100% sure if they have exactly the same meaning or not, but they seem to be used same way. Maybe just choose one?

Figure 4 - make font a little larger?

Figure 5 - indicate what the slashes on the Taylor diagram points represent.

Figure 7 - what are the 'remainder' sites if they are not land or ocean? Remainder sites not mentioned in text. Also explain what 'OLSB s' is in figure legend (the rest of the abbreviations in the legend list were obvious)

Figure 8 - "products used Schutgens" change to "products used in Schutgens"

Figure 9 - "except right-most column" change to "except the right-most column"

Figure 11 - work on arrangement of plots and make sure x-axis label shows on all of them

Figure 12 - larger font at top? changing text so not angled might provide more space

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Figure A2 - caption says "both observations and model data in this paper" but there was no model data in this paper.

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Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2020-1207>, 2020.

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