

Interactive comment on “Quantifying the single scattering albedo for the January 2017 Chile wildfires from simulations of the OMI absorbing aerosol index” by Jiyunting Sun et al.

Anonymous Referee #1

Received and published: 5 March 2018

Review of the Sun et al paper.

Summary

This manuscript uses a case study to illustrate the derivation of the aerosol single scattering albedo using observations from the OMI sensor of large biomass burning event in south Chile in 2017. Although at first sight this manuscript proposes an interesting case study, it fails at many levels: it does not clearly explain what are the objectives to accomplish with this application and does not make clear what was achieved with it, the introduction has too many formal inaccuracies and poor explanations. Also there are missing explanations of the terms using in an equation, these terms are later used

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to describe two figures rendering a significant part of the paper with not clear understanding. This study is not publication ready and my recommendation is to reject as it is. I do see value in this application though. The AAI is a parameter that deserves more attention and studies like these are excellent illustrations on how to use it. However, the manuscript fails to provide enough details and nuance. I would encourage a resubmission if more attention is given to the composition of the manuscript.

A few examples are provided below which by no means are the only ones that need to be corrected:

Abstract:

Line 20-21: a difference in SSA of 0.06 is very big as far as aerosol remote sensing and climate applications are concerned! It is not "slightly" smaller.

Also, missing what is the purpose of this study? And what are the conclusions that the reader should take out of this work?

Introduction:

Line 41: incorrect definition of SSA, it is not a ratio of radiation. This is too basic to be missed.

Line 43-44: No, POLDER does not measure the "aerosol polarized phase function". It measured polarized radiation that can be linked after modeling to the aerosol phase function.

Line 53-54: This is not entirely correct. Eck et al (2013) demonstrated that MODIS retrievals are impacted by the variation of SSA in smoke. (Eck, T. F., B. N. Holben, J. S. Reid, et al. 2013. "A seasonal trend of single scattering albedo in southern African biomass-burning particles: Implications for satellite products and estimates of emissions for the world's largest biomass-burning source." J. Geophys. Res. Atmos. 118 (12): 6414-6432 [10.1002/jgrd.50500])

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Line 60-61: not clear with what you mean that the AAI reduces the retrieval uncertainty. Uncertainty of what?

Line 66-67: this is a poorly phrased sentence and very confusing, the AAI in presence of aerosol is sensitive to aerosol height, SSA and concentration,... not SSA alone.

Overall introduction is too long and it does not make the case on what this study is important, what is unknown and what the objectives are.

Section 2.1

Line 98-99: incomplete/confusing sentence

Equation 2: what is the definition of $\Delta(\lambda)$? , This equation is different than what other groups use as definition of AAI. Can you provide a reference where this equation is derived? It seems to me a minus sign is missing, also not clear where the delta is coming from? For example de Graaf et al., (2007) uses the standard definition of AAI. how does your equation relate with the more commonly used equations? (de Graaf, M., P. Stammes, and E. A. A. Aben (2007), Analysis of reflectance spectra of UV-absorbing aerosol scenes measured by SCIAMACHY, J. Geophys. Res., 112, D02206, doi:10.1029/2006JD007249.)

Line 117: linear interpolation of what? What parameters are being interpolated? Please explain.

Line 123: Aeronet Phase function data is not reported at 354nm , where does this come from? As it is , this is not correct.

Figures 3 and 4 cannot be interpreted because Δ has not been explained/defined.

No further reading of the manuscript since what I found until here warrants a rejection.

Technical comments:

Line 15: what max value was observed? Line 18 : what measurements/obs you are

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referring to? Radiances? Line 18-20: not clear what you want to say in the sentence starting with "Due to the relatively..." Line 20-21: are these SSA values averages over the plume or specific pixels? Line 33: replace "bright surfaces" with "snow", I am assuming this is what you meant. Line 82-83 : what are the locations of Pichilemu and Constitución? Are those forests ? Cities? regions? Please provide more details of the geographical setting. Was there a drought?

Line 84: figure 1 has very poor contrast when printed, please correct.

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2018-40, 2018.

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