

Atmos. Chem. Phys. Discuss., referee comment RC2
<https://doi.org/10.5194/acp-2021-517-RC2>, 2021
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Comment on acp-2021-517

Anonymous Referee #2

Referee comment on "Aerosol properties and aerosol–radiation interactions in clear-sky conditions over Germany" by Jonas Witthuhn et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-517-RC2>, 2021

Witthuhn et al. work is a very intensive study of the aerosol radiation interactions and it is important for understanding the climatic conditions and for other applications. The study is focused on clear sky conditions and a full year of data from several sites around Germany are used. Different Radiative transfer models are used in order to quantify the uncertainty spread by aerosol optical properties and to estimate RE_{ari}. The study builds on the more updated literature on the subject and uses state of the art approach. This is model work of how to treat data and make a thorough study of the conditions and it would be perfect example for future works in the field. Hence, I suggest to be consider for publication in the journal after minor corrections.

L15. Assymetrieï□ assymetry

L53 Please provide the full abbreviation for ECOWAS , since it is not widely known

Figure 2. It needs a little clarification. Some stations are missing the red dot and it is not clear their spot (eg Helgoland). Also, the symbol for sunshine duration is not comprehensible. How much sunshine duration is enough to get the symbol?

Paragraph 2.3 It should be clarified which level aeronet product is used in the study, since the uncertainties are different between lv 1.5 and lv 2.0.

L237 For future studies, it would be interesting to have a more hybrid threshold, as a percentage of sunshine hours , in order to keep the day in the dataset. Since probably 2 hours in summer months it would not be representative, and at winter even smaller periods might be, specially for Northern Germany. For now I think it would be useful to show the percentage or number of days that fulfilled the criterion, at each station, in order to understand the representativeness of the conclusions.

L289 Since AERONET inversion products have a large gap around noon, how this interpolation take place in that case?

L364 The median value is from all data, per station or seasonal per station?

Paragraph 4.1.1. How AERONET SSA is transferred to 550nm? If it through interpolation, a higher uncertainty should be considered. Also, I think it is important to provide a statistic of how many cases are misconsidered , due to the CAMS RA cut off at 1.5 AE.

L397 I think that the explanation is not sufficient in order to consider the uncertainty of CAMS RA ASY. Relative error is more appropriate term for this quantity.

L399. I suggest to show these results in the Appendix, for the inclusiveness of the study.

L523 Linke turbidity is not widely known term. Please provide a definition.

L547 it should be explained in detail, why this inequality is the appropriate measure for the agreement.

Figure 7 and 8. I guess, specially in winter, a lot of days have been interpolated, please provide some statistics about these cases.

691 teĩ□ the

Figure 11 I suggest to use a different color scheme, since it is difficult to see the differnces at the stations. Also use a larger font on the map.

Figure 12 Please explain how the classification of aerosols was made. It is nowhere to be found in the manuscript.

Please also note the supplement to this comment:

<https://acp.copernicus.org/preprints/acp-2021-517/acp-2021-517-RC2-supplement.pdf>