Atmospheric Measurement Techniques Discussions

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Comment on amt-2021-88

Anonymous Referee #1

Referee comment on "Accuracy in starphotometry" by Liviu Ivănescu et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-88-RC1, 2021

In this paper "Accuracy in starphotometry", the authors conducted a comprehensive and thorough study of error sources that affect optical depth (OD) retrievals using starphotometers, and further recommended favorable observing conditions including identifying 20 channels for mediating some of the error sources and improving accuracy in OD retrievals using starphotometers. I am not an expert in starphotometry; thus, I focus my comments on OD retrievals in general and hope other reviewers can comments on starphotometry related discussions. But in general, this is a well written paper that highlights various sources of error in starphotometry. The content of the paper is a significant contribution for further improving accuracies in starphotometery. I recommend publication of the paper after some minor corrections.

Comments:

- Thin cirrus cloud contamination can be a problem for sun-photometer data (Chew, B. N., Campbell, J. Reid, D. M. Giles, J. Welton, S. V. Salinas, and S. C. Liew (2011), Tropical cirrus cloud contamination in sun photometer data, *Atmos. Environ., 45*, 6724-6731, doi:10.1016/j.atmosenv.2011.08.017.). Is this thin cirrus cloud contamination also a problem for starphotometry? Based on the paper, it seems both cloud and aerosol OD can be derived. How, then, do the authors perform the scene identification? Are there error sources related to misidentification of thin clouds and aerosols?
- In section 8, the authors discussed optimal channel selections and provided recommendations for achieving OD accuracy of 0.01. Are the recommendations the same for the TSM and OSM methods?
- Eventually, either aerosol or cloud OD will be derived. This requires an understanding of Rayleigh OD, which is also a function of observing conditions. How much is the error in Rayleigh OD calculations based on the available observations associated with

starphotometers?