

Atmos. Meas. Tech. Discuss., referee comment RC1
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Comment on amt-2021-269

Anonymous Referee #1

Referee comment on "Above-aircraft cirrus cloud and aerosol optical depth from hyperspectral irradiances measured by a total-diffuse radiometer" by Matthew S. Norgren et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2021-269-RC1>, 2021

Comment to "Above-aircraft cirrus cloud and aerosol optical depth from hyperspectral irradiances measured by a total-diffuse radiometer"

This study takes use of the spectral total and diffuse radiation from SPN-S onboard the aircraft to retrieve the layer fine-mode aerosol and total aerosol optical depth, along with the cirrus cloud optical depth. The content fits the scope of the journal fine and provides two potential methods for future use. Thus, I would like to recommend its acceptance for publication after necessary modifications.

Line 23, remove it within "partition the total optical depth it into"

Line 49-50, a recent study by Yang et al. (2020, doi: 10.1029/2019EA000574) also indicated this point and could be cited as a support.

Line 52, "when cirrus is present" is suggested.

Line 61-62, is there any reference to support so high cirrus fraction here? If there is, it is worthy to mention.

Line 54-55, it is worthy to mention other types of thin clouds. For example, there are a large fraction of thin clouds in the Arctic with longwave emissivity less than 0.95 as indicated by Garrett et al. (2013, doi: 10.5194/amt-6-1227-2013), who developed a

spectral radiation based retrieval algorithm for those thin clouds.

Line 77-79, To me, this method is similar to those thin cloud retrieval algorithm that are based on two different band radiation measurements like Garrett et al. (2013) mentioned above.

Line 122, how thin the clouds should be to make this equation reliable?

Line 134, I am not sure if dust aerosol has similar absorption characteristics as clouds, please help explain. Thanks.

Line 169, have low AE values or have a low AE value?

Line 255, "One other" should be "Another"? "outputs" or "falls"

Line 308, 317 and others, personally, I would like to use "from ... to ..."

Line 332-335, Why do not the authros correct the diffuse radiation instead of cloud toptical depth outputs based on the FOV information?

Line 380, "wavelength"

Figure 4, consistent with other figures, the titles in x- and y- coordinates might start with a capital letter.

Line 560, "which is shown"?

Line 613, "related to"

Line 613-615, Please rephrase this sentence since it seems with grammar error.