Atmospheric
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Discussions

Interactive comment on "Estimation of cloud optical thickness, single scattering albedo and effective droplet radius using a shortwave radiative closure study in Payerne" *by* C. Aebi et al.

Anonymous Referee #1

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Review of the study entitled "Estimation of cloud optical thickness, single scattering albedo and effective droplet radius using a shortwave radiative closure study in Payerne" by Aebi et al.

The study presents a method for estimating the cloud optical thickness, single scattering albedo and effective droplet radius from downward shortwave radiation simulations and measurements during days with low clouds (stratus-altostratus) and high clouds (cirrus-cirrostratus) in Payerne, Switzerland in the period 2013-2017. The authors have done a good job to describe their analysis, and demonstrate their findings in a good

way. Results from their method are tested against other methods and good correlations are revealed. The study is suitable for publication in AMT, the manuscript is well written, the findings are well described and in general I find a good paper. I recommend publication after a few clarifications.

Comment 1: Table 1: The table refers to 739 out of 1827 days during the period 2013-2017. Maybe it escaped my sight but I couldn't find out what happened with the remaining days. Can you explain what happens with the remaining 3/5 of the period, e.g. no available sky camera measurements, different cloud types than the ones investigated?

Comment 2: I am confused with the use of terms COT and COT_DSR. From the abstract I understand that COT is the cloud optical thickness calculated from modelled downward shortwave radiation, and that COT_DSR is the cloud optical thickness derived from measured downward shortwave radiation. However in section 3.2, I read that the total DSR and its components, direct and diffuse radiation, are derived from libRadtran, and that the lookup tables, used to estimate the COT_DSR, contain simulated radiation values. I cannot figure out how the ground-based radiation measurements are used to derive the COT_DSR. Please clarify.

Comment 3: In the same motif. Lines 234-235: What is the 'effective COT_DSR'? Do you mean that a modelled COT is used as input to derive the measured COT_DSR? Line 251: It reads 'COT_DSR the cloud optical thickness'. Is this derived from radiation measurements? Line 256: It reads 'These two variables are estimated from a LUT, which was generated using a radiative transfer model'. So, is COT_DSR derived from simulated radiation values and not from measured ones?

Comment 4: Line 310: it reads '6.80 COT'. Is it '6.80 of COT' or is it just '6.80' and COT is a typo error?