Atmospheric Measurement Techniques Discussions

Interactive comment on "Design and performance of a three-wavelength LED-based total scatter and backscatter integrating nephelometer" *by* T. Müller et al.

Anonymous Referee #2

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GENERAL

Scattering coefficient measurements have long been dominated by one manufacturer only so it is most welcome for the whole community to have also another one. The authors have done careful work in characterizing the new nephelometer. This paper is important and it will for sure be referred to by all users of the instrument. There is only one point I was actually missing in it: truncation correction formula that would be analogous to that presented by Anderson and Ogren (1998) for the TSI nephelometer, even though it has its own uncertainties. You do present a very good parameterization

for truncation but using it in interpreting field data requires also size distribution measurements over the whole size range that is measured with the neph. This would of course be the ideal case but there are often situations where the neph is used without size distribution measurements. So I wish you would also give a similar parameterization as A&O98. A first estimate you would get very easily from the data you present in Figure 4: just calculate the Ångström exponent of your simulated size distributions and use that as the x-axis and you get the correction factor as a function of Ångström exponent. The other question related to this is, could you estimate how big an error does it make, if the A&O98 truncation correction is used as such for the Aurora nephelometer? If no size distributions were available, that is what I would do – and I think I am not the only one.

DETAILED COMMENTS

Lines 104 – 110. The formulas (8) and (9) are not quite the same as eq (12) of Anderson and Ogren (1998), you have the second quotitient there as well. You do give a short explanation in lines 109 – 110 but I did not quite understand it. Please explain a bit more in detail. The point is, how do I use that formula when correcting the neph data. The goal is to get corrected scattering by aerosols. So, when I solve the true scattering from (8), then I should also have the value of the second quotitient. Do you present it somewhere in the paper?

Lines 233 – 239 (section 4.2) I think here you have forgotten to show the results. Am I right? You mainly explain how good the calibrations have been in earlier papers but do not show any data or results of Aurora 3000. You just write that according to the manual the uncertainty is 2.5 %. Please show also your own results.

Lines 244 – 255 (section 5.1.1) What is the size range of the OPC? Did you have an SMPS or DMPS as well? Did you measure total number concentration with a cpc? If you did, how well did the integrated number concentration agree with the cpc? I ask this because I expect you also did Mie modeling – did the measured and modeled

scatterings agree? Ok, for the present paper this is not as relevant as the comparison with the TSI neph but still I wonder why you don't present this comparison.

Lines 264 – 265. You write "Equations 12 and 13 can be used to adjust scattering and backscattering coefficients to any other wavelength". I know how this is done but I suggest you also show the formula.

Line 349. "Anderson and Ogren (1996)". The year should be 1998.

Lines 350 – 353 and Figure 8. Which wavelength pairs did you use for the comparison of the Ångström exponents?

Figure 4. A small technical suggestion: change line type of either of the nephs to continuous line. Would make it faster to see from the figures which line belongs to which neph.

Figure 8. What is the r2 of the regressions? Could be added in the subplots.