

Atmos. Meas. Tech. Discuss., referee comment RC1
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Comment on amt-2021-423

Anonymous Referee #2

Referee comment on "Intercomparison of holographic imaging and single-particle forward light scattering in situ measurements of liquid clouds in changing atmospheric conditions" by Petri Tiitta et al., Atmos. Meas. Tech. Discuss.,
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The manuscript "Intercomparison of holographic imaging and single-particle forward light scattering in-situ measurements of liquid clouds in changing atmospheric conditions" compares two droplet size measurement instruments to evaluate their performance and evaluates them against measurements of activated cloud condensation nuclei. All three instruments, the holographic system, the fog monitor and the twin inlet system, were ground-based on a tower. The authors examined the influence of the wind direction to the measurements as well as the effect of the different size ranges. The overall comparison of the instruments is very important in order to evaluate the performance of each to interpret the collected data as well as for future individual deployment. The manuscript fits the scope of AMT well. In general, the manuscript is well written, and I recommend publication with minor revisions.

Main comments

Line 45-50 – Both holography and shadowgraphy are mentioned, but examples are only from holographic instruments. Shadowgraphy could also be instruments such as 2D-S, HVPS, CIP, etc. There is also a big difference between the two, shadowgraphy records shadow images while holography records holograms that need reconstruction to give the equivalent to in-focus shadow images.

Line 52 – Some in-situ instruments (such as the ICEMET) are open path and don't have an inlet as such, there is still loss, but I'd say it's due to air flow around the housing. I'd rephrase that sentence.

Line 72 – Please clarify: 6-10 μm is the minimum detection size, which is twice the effective pixel size (as stated in line 118). This is because at least two dark pixels along one axis of the hologram are necessary to separate noise from particles, sometimes more, especially in high noise holograms.

Line 190 – Why do you not reconstruct those window splashes and discard them? Or are they impacting the entire sample volume, masking real drops?

Fig 6 – How many data points are there per wind direction? Is one direction favored?

What is the upper size limit of ICEMET? This will be important to assess the LWC and MVD, since it is higher than the upper size limit of the FM120 and large drops impact LWC and MVD heavily.

Section 3.2.3 – The underestimation of the FM120 in terms of LWC is probably also due to the fact that ICEMET sees larger drops than FM120, which contribute most to LWC, correct? You only mention the rotating inlet as a reason.

Suggestions for Figures for easier understanding

Generally, Figures are good quality. However, some could be improved to guide the reader. Here are my suggestions:

Fig 3a and Fig 10 – Adding a one-on-one line might be useful to see the deviation from the ideal case.

Fig 5 – It might make sense to put the red line in all panels to mark the smoke periods.

Fig 8 – The data points might be easier to look at if the axes were loglog.

Language

Overall, the language is good. However, please check spelling and grammar carefully. Here is a list of things I found:

Line 79 – The abbreviation DMPS has not been defined yet at this point.

Line 144 – Δt is Δt in equation 1. Same in lines 205/210, I believe.

Line 251 – spelling (“covariability”)

Line 258 – Here, you state that MC and MI are the same, but you use both in different equations. Please make this consistent.

Line 282 – check grammar – please rephrase

Line 325 – spelling (“...ICEMET observed...”)

Line 374 – check grammar – please rephrase

Line 375 – AMT guidelines suggest specific date format (dd month yyyy, as used in line 383)

Line 485 – space missing in “...Korolev, A., Krämer, M.,...”