

## ***Interactive comment on “Design and Field Campaign Validation of a Multicopter UAV and Optical Particle Counter” by Joseph Girdwood et al.***

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Thank you for your comments.

A table has been added in section 4.1 giving better detail behind the CFD-LPT setup. The differences between this study and previous ones are now stressed in the same section. A paragraph in the introduction has been added explaining the significance of measuring cloud droplets in the lower part of the atmosphere.

Since the raw data cannot be saved, see an explanation in an answer to one of your specific points, the bins cannot be reconfigured to have greater resolution in post-

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processing. This is why the re-binned data is used for the main comparison in Fig. 11. Focusing on Fig. 11a since this is the only flight in high-gain mode the only feature in which there is enough resolution to say the two instruments definitely disagree is the peak around 5-7 $\mu$ m, which is often considered an artefact of the CAS. A comparison with POPS is planned, but this will be presented in a future paper.

With regards to your point on dismissing the undercounting of particles due to the airflow effects described in previous sections too quickly, the simulations also show that all the droplet sizes relevant here would be affected by an equal magnitude. Since, as you correctly point out, Fig. 10 shows that the droplet sizes with the highest uncertainty are below 7 $\mu$ m, I think it is unlikely that this is the cause. The manuscript has been amended stating this.

In response to your specific comments in order:

1. Artefact is the English (US) spelling and artifact is the English (UK) spelling (<https://www.lexico.com/definition/artefact>).
2. The abstract has been rephrased to reflect that the miniaturisation of many optical components for example lasers, optics, and detectors often leads to lower thermal and electrical stability and (for example photodiodes against photomultiplier tubes).
3. POPS is now cited as an example.
4. The phrase was changed to spatio-temporal as opposed to just temporal.
5. Another example was added to section 2.
6. With a take off mass of 3.2kg the endurance was 13min. The take off mass used was 2kg, the endurance for which is 18min. These figures were obtained from averaging flight logs for flights when the batteries were fully depleted. The manuscript has been changed to reflect this.

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7. Thank you for pointing this out. The intention behind this statement was to emphasise that, since the RCASS and SUA had to be developed in tandem with a tight time constraint, the design contained features which could be changed quickly—such as the inlet—without altering the core design. Since you have pointed this out, however, I realise that there is not much point stating this in a research article, so I have taken it out.

8. The raw data are not saved. This would take too long to transfer to the data-logger and lead to an unacceptable level of sub-sampling at the same temporal resolution, and the high resolution is one of the major benefits of the SUA platform, so it is unwise to compromise this. 16 bins are the maximum and a faster instrument microcontroller would be required to increase this.

9. Fig. 9 has been deleted.

10. Table 1 has been deleted.

11. Fig. 11b now has a log-log scale and the points are easier to distinguish.

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