

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, here are my responses in order:

1. The induced change in continuous phase temperature changing particle size was considered during the simulation analysis. However, the maximum change in temperature throughout all points considered for sampling—including parts along the trajectory of a droplet from when it enters the domain to when it gets sampled—was 0.012°K . Considering a droplet would be exposed to this temperature field for 0.16s, since the vertical distance this temperature field extends to is 0.8m above the propeller plane, this is certainly not enough of a perturbation to cause any significant change in

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droplet size. The manuscript has been amended to reflect this in section 4.2.

2. The electrical field was never modelled, because all the testing was conducted with droplets which carry very little charge and are unlikely to be deflected or scavenged by a charged airframe. This deflection artefact, therefore, is not applicable to the paper as it stands. However, your comment does highlight the need to consider such artefacts in the design process when applying these measurements to solid particles, particularly in areas where high charge density is likely to be encountered. In principle CFD-LPT could be combined with electrostatic modelling to characterise particle trajectories in a similar way to how CFD-LPT was used in this paper as it stands. However, the electrostatic portion of the model will be strongly dependant on the charge of an individual particle. This can significantly vary depending on aerosol type—and quantitative analysis of dust turbulent triboelectric charging, for example, is awaiting conclusions of ongoing research (Daskalopoulou et al., 2020). The manuscript has been amended to reflect this in section 4.1.

3. The DMT FM-120 cannot be operated at temperatures below 0°C , which were expected during the campaign. The CAS overlaps more of the RCASS size range than both the FM-120 and CDP.

4. Thank you for picking this up, the CAPS was oriented into the wind throughout all measurements. I have added a comment in section 5.1 stating this.

References:

Daskalopoulou, V., Mallios, S. A., Ulanowski, Z., Hloupis, G., Gialitaki, A., Tassis, K., and Amiridis, V.: The Electrical Activity of Saharan Dust as perceived from Surface Electric Field Observations in Greece, Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2020-668>, in review, 2020.

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2020-247, 2020.

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