

Interactive comment on “A new multicopter based unmanned aerial system for pollen and spores collection in the atmospheric boundary layer” by Claudio Crazzolaro et al.

Pope (Editor)

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The paper describes a new UAV based particle collection system (PCS) for measurement of bioaerosols in the atmospheric boundary layer. The design and testing of the PCS is rigorous and clearly explained with precise language used throughout. The authors have made great efforts to investigate possible sources of error and bias. The ability and promise of the new system is shown in a series of test flights. The measured bioaerosol concentrations from the test flights compare favourably to collocated measurements. The paper represents a new measurement technique for bioaerosols and should be published after the authors consider the following minor comments.

C1

Abstract and Figure 10 It is unclear what ‘charcoal’ particulate matter is? Is this black carbon? Black carbon greater than 20 µm in size is surprising. Provide more details about what this particulate matter is.

P2 – PM2.5 and PM10 should be defined

P2 – “weighted” should be “weighed”

P2 – the authors may be interested in the work from my group looking at pollen as cloud condensation nuclei, similar to the Hassett et al. 2015 work cited. - Pope, F.D., 2010. Pollen grains are efficient cloud condensation nuclei. *Environmental Research Letters*, 5(4), p.044015. - Griffiths, P.T., Borlace, J.S., Gallimore, P.J., Kalberer, M., Herzog, M. and Pope, F.D., 2012. Hygroscopic growth and cloud activation of pollen: a laboratory and modelling study. *Atmospheric Science Letters*, 13(4), pp.289-295.

P3 – It’s not clear how the spatial and temporal distribution of pollen would help in paleo reconstruction. Either provide more detail or remove.

P3 L29 – “...to determine how to dimension and where to position...” confusing sentence, reword.

P4 L11 – 200.000 sccm level of precision seems unlikely.

P5 L8 – “. . . DJI S900 worked reliable and robust” provide more detail. How do you define reliable and robust? How does reliable differ from robust?

P5 L28 – how did you determine that observation of 10 particles was statistically robust?

P6 L1 (and elsewhere) – “isokinetic-near” should be “near-isokinetic”.

P7 L11 – define what “lean workflow” means.

P8 L10 – “irrespectively whether” should be “irrespective of whether”

P12 L7 – I’m not sure what “technics” means in this context. Section 3.1 – I found this

C2

section confusing. P12 L10 states that the UAV affects air up to 2 m above it. Figure 6B confirms that air 20 cm above the UAV is definitely affected. Figure 6A shows that air 80 cm above the UAV is somewhat affected. The inlet is positioned 30 cm above the UAV (section 4.1). More rationale is required. Table 1 – Do not use slang “coptor”

P17 L16 – provide more detail to justify the “very good agreement” with the CFD calculations.

P19 L1 – “no particles would be deposited on the sample...” this is likely true for particles above a certain size. Estimate the size range that the sample procedure is relevant for.

P19 L21 – similar to the previous comment (P19 L1) need to define more precisely the size range the sampling will work for. What do you consider ‘small’ and ‘very small’ particles.

P21 L10 – confusing sentence “. . . as mean values of 25 m, 200 m and 300 m” rewrite.

P21 L1 – the contamination at ground level is going to be dependent on local source, e.g. a pollinating tree nearby could cause significant contamination. Need to provide more nuance. Table 3. Difficult to read the smaller bits of text. Also layout is confusing. Rework to improve readability.] Figure 11 – curved lines are unhelpful since they have no physical meaning, use either straight lines or remove lines completely (my preference).

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