We would like to thank both reviewers for their time and suggestions to improve our manuscript, we really appreciate their effort. Below can be found responses to reviewers' comments as RC - reviewer comment and AA – authors answer.

Reviewer 2

This data description paper is a very important addition to the already published data from the Pallas Cloud Experiment 2022. It contains information about the measurement system, data acquisition, measurement strategy and some intercomparison with other instruments. It is good to see researchers presenting their methods and instruments alongside published datasets!

Most information is sufficient to understand and further use the data, including its peculiarities, but especially for the csv-Files with its high accessibility, details are needed for people not being part of the experiment to make most out of the data.

Although I don't feel qualified to make comments on the language, the text might benefit a lot from using a language tool or a native speaker, in addition to some basic decisions (data as singular or plural? Direct or indirect speech?) to be followed throughout the text.

In the following, you'll find some specific comments with line numbers:

RC: L17: "..all [atmospheric?] models"; add a reference to the statement?

AA: The word "atmospheric" and the reference to Morrison et al, (2020) were added.

RC: L47: please omit the word "please"

AA: word "please" was omitted.

RC: L55: Why is it suitable (include a reference for the statement)? Or is it intended to be used for .. ?

AA: The wording was changed according to reviewer suggestion to " It is intended to be used for air quality monitoring…". And Figures 4 and 5 of this manuscript, in our opinion, also suggest that it is suitable for such tasks.

RC: L62: rather mention the relative airflow in the drone coordinate system than wind speed? E.g. a racetrack with the wind would decrease the relative airflow (and therefore affect the sensor ventilation).

AA: In our operation, the drone is moving strictly in vertical column always heading into wind, thus there is no relative movement of the drone in horizontal axis, except for cases with very high winds (>15 m/s), when the drone slides from desired coordinates. The sentence was changed accordingly: "…the aspiration rather depends on drone vertical move and horizontal airflow for the air exchange around the sensors."

RC: L63-70: from my perspective, there are too many details not relevant for working with the data (for example it is not important to name the interfaces used for the sensors, e.g. I2C/SPI/Serial/..), please consider shortening this paragraph.

AA: The technical details were omitted according to reviewers' suggestions.

RC: L72-75: Is the source code available on git? Maybe describe some more your wind estimation algorithm to allow the user to estimate its strength and weakness?

AA: Unfortunately, the code is not available. As stated in manuscript on L74 "A proprietary wind algorithm version 2.2 and Mavic 2 pro aerodynamic profile were used for wind estimates within this manuscript."

RC: Table 1: This is a good starting point to show the manufacturers estimates on resolution/accuracy/uncertainty and response time; maybe fill up the values not provided in datasheets with your estimations? E.g. Res/Acc for OPC, Vertical positioning for GNSS. I somehow missed a concluding table with your guess on resolution/accuracy/uncertainty and response time of your whole measurement system, which likely will achieve slightly less accurate measurements on a drone than in the lab. In addition, isn't the response time of RH temperature dependent? If so, please make a comment (at least reference temperature for the response time).

AA: Table 1 was updated with OPC-N3 resolution in PM fractions; however the accuracy estimates are highly influenced by ambient conditions e.g. high humidity and extreme temperatures. We aimed to provide an overview on accuracy and uncertainty of all sensors with our measurements against the reference instrumentation at the Sammaltunturi station and Kumpula campus, Figures 4 and 5, with included linear fits and coefficients of determination.

RC: L84..86: Can you provide some links to the mentioned networks (ACTRIS/ICOS/..) and mention implications/benefits for the station and its measurements?

AA: Links to research programs at Pallas supersite (https://en.ilmatieteenlaitos.fi/pallas-atmosphere-ecosystem-supersite) were added to text. ICOS (https://www.icos-cp.eu/), ACTRIS (https://www.actris.eu/) and EMEP (https://emep.int/). Also reference to overview manuscript research programs at Pallas by Lohila et al. (2015) was added.

RC: L87ff: A map (although referred to a map in another publication later in the text) and especially a picture of the sites and conditions during the experiment could help a lot to understand data and the general environment (snow/grass/flora), including the low level clouds during fall.

AA: Figure 2 was added to manuscript as suggested.

Figure 2. A map showing locations of sampling sites: a) the UAV take-off/landing site next to main road 957 Pallaksentie (68°1'10.30"N 24°8'57.84"E, 304 m ASL. b) the Pallasjarvi lake beach (68°01'23.2"N 24°09'48.8"E, 276 m MSL). c) Calibration flight on the top of hill next to Sammaltunturi station (67°58'24.0"N 24°06'56.3"E, 560 m ASL). Background map courtesy of © Google Maps.

Also, there is a dedicated YouTube playlist from PaCE2022, that provides insight into environment and conditions during the campaign. All that information is included in our PaCE2022 Overview manuscript, that we were advised by editors to publish as last in this special issue.

https://www.youtube.com/playlist?list=PLK2ec25bvC9PddfM9ezMyhjbaU7B1MMfc

RC: L100: consider omitting the text about programming the mission

AA: the sentence was restated to: “The flight missions were conducted by using DJI GO 4 software, and both ascent and descend rates were set the same to 1 m s^{-1}.”

RC: L110: add a reference to the picture/section where one can see the RH bias?

AA: The reference to Figure 5 b was added.

RC:L122: please explain the altitude further - is it mean sea level in addition to a specific geoid (e.g. EGM96)? Consider using GNSS instead of GPS.

AA: The positioning data are taken from DJI flight records. DJI drones rely on a barometric altimeter, this sensor measures air pressure to determine changes in altitude relative to the take-off point. The barometric altimeter is crucial for flight control, it's not a geodetic measurement and is susceptible to atmospheric pressure changes. The reported altitude is not the same as a geoid-derived orthometric height. The actual atmospheric pressure varies significantly with weather, temperature, and local conditions. So, while it's "above sea level" in the sense of a standard atmospheric model, it's not a precise geodetic Mean Sea Level (MSL) as defined by a geoid.

The GPS was changed to GNSS as suggested.

RC: L132: Good to read how the data was synchronized. You might add a short note of the error you expect in the time synchronization.

AA: Similarly as above, the sensors' data (1Hz) are synced with DJI flight records (10 Hz), we expect maximum error in sync of 1 sec. The sentence was changed as follows: “This issue was resolved by adjusting the time using a lag calculation based on a cross-correlation between the measured pressure by BME280 and recorded altitude by DJI Mavic 2 pro, we estimate the maximum error in synchronization to be 1 second.“

RC: L146: consider adding a reference about sampling losses.

AA: The reference about sampling losses calculations for OPC-N3 on drone could be found in Supplementary Materials of Julaha et al. 2025. The reference was added.

RC: L168: please add a reference/table for the dataset levels (b1 here) so the reader is able to understand it.

AA: The sentence was changed as follows:”... the published dataset is at level b1 (i.e. data with quality control checks applied and missing data points or those with bad values were set to −9999.9) with no calibration factors applied, as specified in Brus et al., (2025c).

L195: is all information about the processing steps (some nonlinear corrections / wind estimation algorithm and parameters / ..) present in the publication to allow dataset users to understand the (pre-)processed data?

Regarding dataset users:

RC: For the nc-Files, metadata description within the file is clear (although no instrument is mentioned in the variable attributes for e.g. particle concentration), but for the CSV file, more information within this data description paper would be helpful (e.g. bin numbering and bin size/edges in a table, not just within the text[L127]). A concluding table with estimated overall uncertainty, response time and e.g. repeatability for each variable in your datasets might strongly increase the ability of dataset users to work and publish with the provided data.

This publication is a very important addition to the provided datasets, once all (or at least most of) the meta-information is well presented!

AA: We agree that concluding table with estimates overall uncertainty, repeatability for each variable would be of great benefit. However, only close by reference at the sampling places were other platforms, tethered balloons and UAVs, their data sets will be available in this special issue. We plan to do rigorous analysis combining all platforms and available data sets in this special issue.

The metadata csv file was uploaded to Zenodo database of this data paper repository. The metadata file contains: Bin low boundary (particle diameter [um]), Bin mean (particle diameter [um]), Volume of a particle in bin (um^3) and Weighting for each bin.

References:

Morrison, H., van Lier-Walqui, M., Fridlind, A. M., Grabowski, W. W., Harrington, J. Y., Hoose, C., Korolev, A., Kumjian, M. R., Milbrandt, J.A., Pawlowska, H., Posselt, D. J., Prat, O. P., Reimel, K. J., Shima, S.-I., van Diedenhoven, B., Xueet L.: Confronting the challenge of modeling cloud and precipitation microphysics. Journal of Advances in Modeling Earth Systems, 12, e2019MS001689. https://doi.org/10.1029/2019MS001689, 2020.

Lohila A., Penttilä T., Jortikka S., Aalto T., Anttila P., Asmi E., Aurela M., Hatakka J., Hellén H., Henttonen H., Hänninen P., Kilkki J., Kyllönen K., Laurila T., Lepistö A., Lihavainen H., Makkonen U., Paatero J., Rask M., Sutinen R., Tuovinen J.-P., Vuorenmaa J. & Viisanen Y. 2015. Preface to the special issue on integrated research of atmosphere, ecosystems and environment at Pallas. Boreal Env. Res. 20, 431–454.

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