We would like to thank the reviewer 2 for the thorough and constructive feedback on our dataset and manuscript. We appreciate the time and effort taken to evaluate the data quality and presentation, and we are pleased that the dataset is recognized as a valuable resource for cloud microphysics and meteorological research. Below can be found responses to reviewers' comments as RC - reviewer comment and AA – authors answer.

Reviewer 2: The manuscript "In situ cloud surface measurements dataset from four cloud spectrometers during the Pallas Cloud Experiment (PaCE) 2022" provides information about cloud microphysical data collected during several months with four different in situ cloud probes.

Description of the instrumentation, calibration procedures, operations and related difficulties and challenges are clearly presented. Especially part linked to limitations for individual instruments is really good and useful for potential users.

RC1 Title: I would like to propose change to "In situ surface cloud measurements....." Current title "cloud surface measurements" is confusing as no cloud surface was measured.

AA1: We agree with the reviewer that the current title may lead to confusion. We will revise the title to *"In situ surface cloud measurements..."* to better reflect the nature of the dataset.

RC2: CAPS fixed orientation. I would like to propose adding one more "flag" parameter to data file which will include if measurements were from good and bad wind sector as defined by authors.

AA2: As already discussed with Reviewer 1, we will add a flag in the data files indicating whether each measurement is within or outside the defined "good wind sector," as described in the manuscript. This addition will help users filter for higher-quality data more easily. Flag usage will be described in section 3.

RC3: CAS clearly suffered significant losses due to inlet orientation. What was the reason to install the inlet vertically? Then losses are extremely difficult to quantify.

The fixed orientation of the CAS inlet was primarily due to the physical dimensions of the instrument and the constraints imposed by the manufacturer-recommended setup. The installation followed the configuration provided by the manufacturer, which was also used in previous deployments such as the one described in Doulgeris et al., 2020.

RC4: Although this is not research paper I wonder what is the local orographic effect at the site. This is valuable and important information for potential users if they would like to extrapolate the measurements to larger scale or compare with other sites.

AA4: Indeed, orographic effects are present at the site and their influence varies depending on the synoptic situation. During certain conditions, clouds are advected very close to the surface and interact directly with the terrain (i.e., classic orographic clouds). At other times, clouds approach the station from above, without being directly forced by the terrain.

To distinguish between these scenarios, we rely on continuous remote sensing measurements from the nearby Kenttärova station, which is equipped with a ceilometer and cloud radar. These instruments provide vertical cloud structure and base height information that help us assess whether cloud formation is orographically driven in each case.

A detailed overview of the remote sensing setup and its application in classifying cloud types during the PaCE 2022 campaign is provided in Tukiainen et al. (2025)

RC5: I am curios how was done correction for flow changes due to icing (page 9 lines 208-211). It is not only about changes in airflow in wind tunnel. Icing will also change the flow pattern and increase losses dur to impaction and turbulence.

AA5: We thank the reviewer for this comment. We acknowledge that the phrasing in the manuscript was misleading. In reality, no correction was applied to account for changes in flow due to icing. Instead, data segments where icing was evident as described in the manuscript either through observed instrument malfunction, visual inspection or unrealistic microphysical signatures were excluded from the dataset entirely or flagged in the updated dataset.

We will revise the corresponding section in the manuscript to reflect this and avoid any misunderstanding. We also agree with the reviewer that icing affects not only the flow rate but also the flow dynamics, further justifying our decision to exclude such periods rather than attempt unreliable corrections.

RC6 : Page 9 (lines 233-241). Listing of all size bins is not necessary in the manuscript. This info should be metadata in data repository.

We accept this suggestion and will remove the detailed list of size bins from the main manuscript. This information will be included instead as part of the metadata in the data repository to maintain clarity and conciseness in the text.

RC7:Figure 2 does not add to the manuscript much of valuable information and can be reduced to one text paragraph

We thank the reviewer for this suggestion. While we understand the concern, we believe that Figure 2 provides a helpful visual summary of the campaign timeline and instrument availability, which may be useful for users to quickly assess data coverage and operational context. We have revised the figure and its caption slightly to enhance clarity and reduce redundancy with the text, but we would prefer to retain it in the manuscript for the benefit of data users.

RC8: Page 14, Line 319: MVD and ED can be accurately derived only for periods when instruments measure properly and did not suffer losses and which cannot be accurately corrected. I am curios what instrument did provide most of the good quality data for the MVD and ED? FSSP-100?

We agree that accurate derivation of MVD (mean volume diameter) and ED (effective diameter) depends on reliable measurements. However, even during periods when some cloud droplets may be lost due to suboptimal probe performance or positioning, MVD and ED can still be meaningfully derived, particularly when the losses affect the full size spectrum rather than being size-selective. In such cases, the shape of the droplet size distribution remains relatively unaffected, and the derived parameters remain robust. This behavior has been discussed in Doulgeris et al. (2020) and similar patterns were observed during the ECCINT Sonnblick intercomparison campaign (manuscript in preparation, to be submitted in 2025).

In our campaign, the most reliable MVD and ED values were obtained when probes were oriented optimally with respect to the wind, minimizing sampling losses. The FSSP-100 and ICEMET probes generally provided the highest-quality data under such conditions.

Reviewer 2: Overall this is well written dataset description with very good instrumental section and after some revisions suitable for publication in ESSD.

references:

Doulgeris, K.-M., Komppula, M., Romakkaniemi, S., Hyvärinen, A.-P., Kerminen, V.-M., and Brus, D.: In situ cloud ground-based measurements in the Finnish sub-Arctic: intercomparison of three cloud spectrometer setups, Atmos. Meas. Tech., 13, 5129–5147, https://doi.org/10.5194/amt-13-5129-2020, 2020.

Tukiainen, S., Siipola, T., Leskinen, N., and O'Connor, E.: *Remote sensing measurements during PaCE 2022 campaign*, Earth Syst. Sci. Data Discuss. [preprint], https://doi.org/10.5194/essd-2024-605, in review, 2025.