Response to File validation review:

1. Please include the corresponding authors` names alongside the email addresses in the "Corresponding author" section of the title page with the next file upload.
Response: Added corresponding authors' names alongside the email addresses.

2. Your reference list includes a work "in preparation". Such works can be cited upon submission if being available to the reviewers. They should not be cited in the final, accepted manuscript, unless published, accepted for publication, or available as preprint with a DOI.
Response: Noted. We cite only published, accepted for publication, or preprints with a DOI.

Response to Reviewer #1:

The authors have substantially revised the manuscript, better emphasizing the influence of transport on the observed evolution of particle size distribution during NPS events. My previous comments have been addressed. I have only one following comment on the interpretation of Fig. 7f.

1. Lines 469-461: It was claimed that after dilution, particle concentration decreased, and organic vapors shifted to the gas phase. This is difficult to understand. Since particles have been diluted, the particle-phase concentration per unit volume should decrease, and there should not be a large pool of particle-phase molecules that could evaporate back to the gas phase. My understanding of Fig. 7f is that the local measured condensable organic vapors did not appear to be a governing factor of particle growth (along the transport trajectory).
Response:
Both the NPF and NPS events exhibited similar spatial scales, indicating that they were driven predominately by regional air-mass dynamics and aerosol processes. During NPS events, Fig. S11 shows a shift in the modal diameter of the volume size distribution from larger to smaller particle sizes. This shift was accompanied by low total particle volume concentrations (Fig. 6l) and a low condensation sink (Fig. 6k), indicating enhanced turbulent mixing or entrainment of cleaner background air masses. The concurrent decrease in integrated particle volume concentration (Fig. 6l), together with the increase in LVOC and SVOC concentrations (Fig. 7f), suggests a reduction in particle-phase material per unit air volume during NPS events. In contrast, during NPF events, the volume size distribution shifted toward larger diameters, consistent with particle growth driven by condensation of low-volatility vapors and/or coagulation-assisted growth. We have included Fig. S11 in the supplementary material.

We have revised the statement in the abstract (Lines 8-9) to: "Furthermore, fast-moving air masses can enhance turbulent mixing, thereby altering the particle size distributions" and accordingly in the conclusions (Lines 495-496).

We have further revised the discussion (Lines 476-480) to "Consistent with this interpretation, the shift in the modal diameter of the volume size distribution from larger to smaller sizes (Fig. S11), together with the low total particle volume concentrations (Fig. 6l) and elevated LVOC and SVOC concentrations (Fig. 7f), points to the evaporation of condensed material during NPS event days."

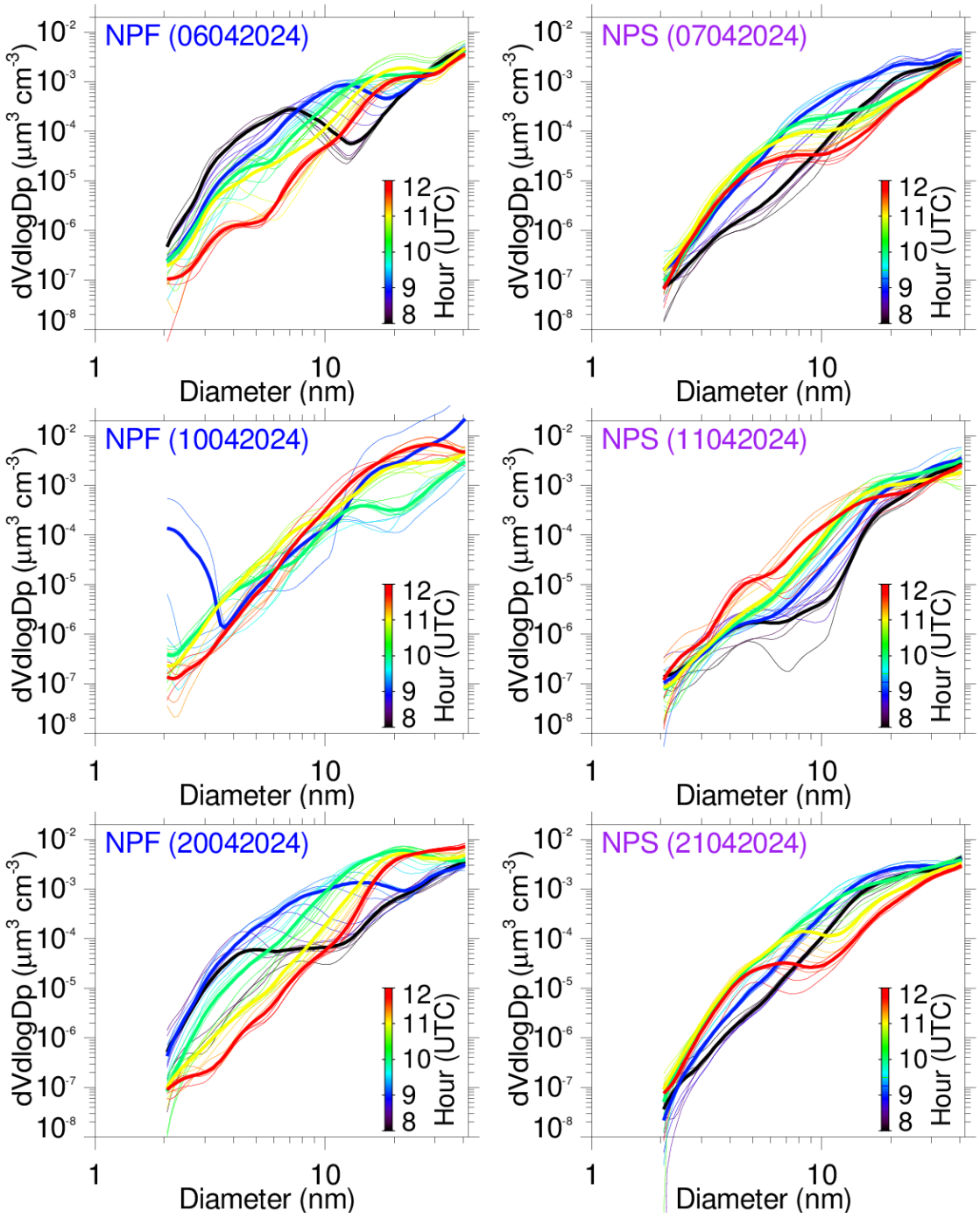

Figure S11. Ten-minute (thin lines) and hourly (thick lines) median particle volume size distribution (negative polarity) from NAIS during the observed NPF (left column) and NPS (right column) events.

Response to Reviewer #2

General

The manuscript has been improved from the previous version in structure, content, and presentation, and is now ready for publication with some small technical revisions. I do not see a reason to ask for further reviewer comments.

Technical revisions

Line 228: Space between the words "events" and the reference is missing. Please also check for other such cases.

Response: Corrected as "events (Kulmala et al., 2004)" and checked throughout the manuscript for such cases and other typographical mistakes.

Line 238: The word "often" is misleading here, as neither in Dal Maso et al., 2005 nor in this study are do the DMD cases represent the majority of all NPF events observed. Please rephase.

Response: Agree, we deleted the word "often"

Line 358: The reference to Kivekäs et al., 2016 seems to be incorrect here.

Response: Agree, we removed it.

References

Kulmala, M., Vehkamäki, H., Petäjä, T., Dal Maso, M., Lauri, A., Kerminen, V. M., Birmili, W., and McMurry, P. H.: Formation and growth rates of ultrafine atmospheric particles: a review of observations, Journal of Aerosol Science, 35, 143-176, http://dx.doi.org/10.1016/j.jaerosci.2003.10.003, 2004.