

## Response to Reviewer #2

We sincerely thank the reviewer for the valuable feedback and comments, which have helped to improve our manuscript. In the following, we address the general and specific comments point by point. The reviewer's comments are given in **black bold italic**, while our responses are in normal font (non-bold, non-italic). Revised sections in the manuscript text in response to the comments are written in blue. The page and line numbers refer to the revised version. The figures and tables used in the responses are labeled the same as the revised version.

### **Comments and suggestions:**

***This measurement report presents size distribution measurements of aerosol particles and ions with a particular focus on sub 10nm sizes captured at a measurement tower in the central Amazon rainforest. The measurements are taken with different state-of-the-art instruments during a period representing the wet and dry season of the region. The data is analyzed with respect to seasonal differences, diurnal variations and the influence of pollution. The paper provides valuable insights in aerosol particle concentrations and size distributions, particularly for diameters below 10 nm, for the Amazon rainforest. However, major improvements are required. I recommend to accept the paper after the following improvements have been addressed:***

### **Responses and Revisions:**

Thanks for the constructive and encouraging feedback. Following the comments and suggestions of the reviewer, we have addressed all the raised points to improve the quality of our manuscript. Please find below our detailed responses to each of the comments.

### **Comments and suggestions:**

***Section 2.2.4: Was the intercomparison also repeated during and/or after the measurement campaign to ensure that the instruments didn't change during the measurement campaign? Also, the presented intercomparison is only considering two of the three instruments. It would be good to have an intercomparison between all the three instruments.***

### **Responses and Revisions:**

We thank the reviewer for pointing out the importance of instrument intercomparison throughout the campaign.

Regarding intercomparisons during/after the campaign between TSI and Airmodus, we were unable to perform a repeated intercomparison during or after the campaign, primarily due to malfunctions with the TSI Nano-Enhancer during our campaign. As a result, the TSI system was operated without the Nano-Enhancer throughout the measurement period, leading to a cut-off size of approximately 10 nm. This configuration prevented any overlap between the TSI system and the Airmodus PSM in the sub-10 nm range. Consequently, a full intercomparison involving both the PSM and SMPS was not feasible after the campaign.

However, to ensure the reliability of the PSM data, we followed the quality assurance procedures recommended by Lehtipalo et al. (2022). This included routine checks of the background signal, instrument stability, and proper operation protocols to maintain data integrity during the campaign.

About the intercomparison among all three instruments, we agree that a comprehensive intercomparison including the NAIS would be valuable. However, the lowest detection limit for NAIS in the particle mode is between 2 and 3 nm depending on the corona voltage as well as the properties and composition of carrier gas (Manninen et al., 2016). The intercomparison between NAIS and SMPS may be strongly influenced by their lowest detection limit. Moreover, conducting a side-by-side intercomparison between TSI (Enhancer + CPC) and the NAIS also presents significant technical challenges due to the high sampling flow rate (54 L/min) of NAIS, which makes it difficult to generate high concentrations of sub-3 nm particles for parallel measurements.

We operated the NAIS by following well-established protocols and recommendations provided in Manninen et al. (2016), which includes regular monitoring of the flow rate, ion mobility spectra, and background levels, to ensure consistent performance of NAIS throughout the campaign.

### **Comments and suggestions:**

***Line 209-210: The combined size distribution in Figure 2c disagree significantly for the sizes around the stitching point of NAIS and SMPS at 40 nm for most of the measurement period. For some periods the disagreement is more than one order of magnitude. The disagreement can also be seen in Table 1, where SMPS reports a median of 27 #/cm<sup>3</sup> in the size-range 10-40 nm for “all period”. However, for NAIS (particle) the size range 12-40 (i.e. the subtraction of the concentrations in the size range 2-4 and 4-12 from the concentration for the size range 2-40) reveals a value of 310, which is one order of magnitude larger than the SMPS value. Why is there such a large disagreement and which instrument is correct?***

### **Responses and Revisions:**

We thank the reviewer's comments regarding the disagreement between the NAIS and SMPS measurements around the stitching point (40 nm) in Figure 2c and Table 1. We acknowledge that the particle concentrations measured by the NAIS and SMPS show notable discrepancies in the overlapping size range (between 10 and 40 nm), with the NAIS reporting notably higher values.

The large discrepancy between SMPS and NAIS measurements can be attributed to differences in their detection principles, sampling efficiencies, and particle losses. The SMPS measures particle number concentration using differential mobility analyzer (DMA) and a condensation particle counter (CPC). Specifically, the CPC used in our SMPS has a 50 % detection efficiency at approximately 10 nm, which limits its sensitivity to particles around 10 nm. Additionally, the 1 L/min inlet flow rate used during our measurements likely led to substantial diffusional losses. Although the inlet losses were calibrated using size-dependent penetration efficiency, residual uncertainties may still remain. These include potential inaccuracies in particle loss models, uncertainties in flow rate control, and environmental fluctuations that may affect diffusion rates and particle behavior (Kangasluoma et al., 2020; Von Der Weiden et al., 2009).

In contrast, the NAIS determines particle number concentration using electrometers and uses a corona charger to charge neutral particles (Mirme et al., 2007). Electrometer is highly sensitive. While this method allows detection of particles as small as 2 nm and benefits from high total flow rates (54 L/min) that reduce diffusional losses, the corona charging process is sensitive to environmental conditions such as relative humidity and aerosol composition, introducing uncertainty in the detection efficiency and size cut-off (Manninen et al., 2016).

Overall, SMPS may underestimate small particle concentrations due to diffusional losses and CPC cut-off limitations, NAIS may overestimate them due to high-sensitivity electrometer detectors and uncertainties in the corona charging process.

To further clarify, we have summarized a table comparing particle number concentrations measured by both instruments in the Amazon region, which demonstrates that our individual SMPS and NAIS results generally fall within the range of values reported in previous studies. These differences across studies may be attributed to variations in measurement periods, locations, and inlet configurations.

Table 1. Summary of particle number concentration measured with SMPS and NAIS in Amazon region

Instrument	Size range	Measured period	Number Concentration* (cm <sup>-3</sup> )	Literature
SMPS	10-50 nm	Feb 2014 to Sept 2020	49 (29-81)	(Franco et al., 2022)
	10-30 nm	Feb 2008 to Jul 2010	40 (10-121) **	(Rizzo et al., 2018)
		Nov 2012 to Oct 2014	89 (24-338) **	
	Ultrafine	March and April 1998	48 (median)	(Zhou et al., 2002)
	10-40 nm	Dec 2022 to Jan 2023	27 (13-63)	This study
NAIS	2-12 nm	Jan to Jun 2014	473 (170-963)	(Wimmer et al., 2018)
		Jul to Dec 2014	545 (207-1132)	
	2-12 nm	Dec 2022 to Jan 2023	1152 (799-1570)	This study

\*The number present median values and the 25th-75th percentiles are in brackets.

\*\* The 10th and 90th percentiles are in brackets.

It is also important to note that discrepancies around the stitching point between NAIS and SMPS are commonly shown in the literature. For instance, Figure S3(a) in Yao et al. (2018) and Figure 1 in Olin et al. (2022) both show similar discontinuities. Such inconsistencies are often related to fundamental differences in instrument design, detection principles, and uncertainties near the lower and upper detection limits of each instrument.

We have clarified this point in the revised manuscript and referred to relevant literature to help explain the observed mismatch, as shown in line 239-246.

“Additionally, in Fig. 2c, a noticeable difference was observed between NAIS and SMPS measurements around the stitching point (40 nm), which has also been reported in previous studies (Yao et al., 2018; Olin et al., 2022). This likely reflects differences in detection principles, instrument uncertainties, and sampling losses near their respective detection limits. SMPS may underestimate small particle concentrations due to diffusional losses and CPC cut-off limitations (Kangasluoma et al., 2020; Von Der Weiden et al., 2009), while NAIS may overestimate them due to high-sensitivity electrometer detectors and uncertainties in the corona charging process (Mirme et al., 2007; Manninen et al., 2016).”

#### **Comments and suggestions:**

**Line 210-211: It would be good to explain the term “Amazonian bananas” and to mention, where the “Amazonian bananas” can be seen in Figure 2c.**

#### **Responses and Revisions:**

Thanks for pointing this out. The term “Amazonian bananas” does not have a formal definition. In our manuscript, we adopt the terminology used by Pöhlker et al. (2018) and Franco et al. (2022), where “Amazonian bananas” refer to particle growth events that typically initiate at larger sizes, around 20 to 40 nm, rather than starting from a few nanometers as seen in classical new particle formation (NPF) events. In Figure 2c, we highlight two representative examples on December 7 (12.07) and January 20 (01.20), where such growth patterns are clearly visible. These examples are marked with dashed rectangles in the figure to emphasize the characteristic “Amazonian banana” behavior.

We have updated the manuscript accordingly (see line 218-220).

“We observed several instances of 'Amazonian bananas', characterized by particle growth initiating at a diameter between 20 and 40 nm, consistent with the observations reported by Pöhlker et al. (2018) and Franco et al. (2022). Notable examples include December 7 and January 20, which are highlighted in Fig. 2c.”

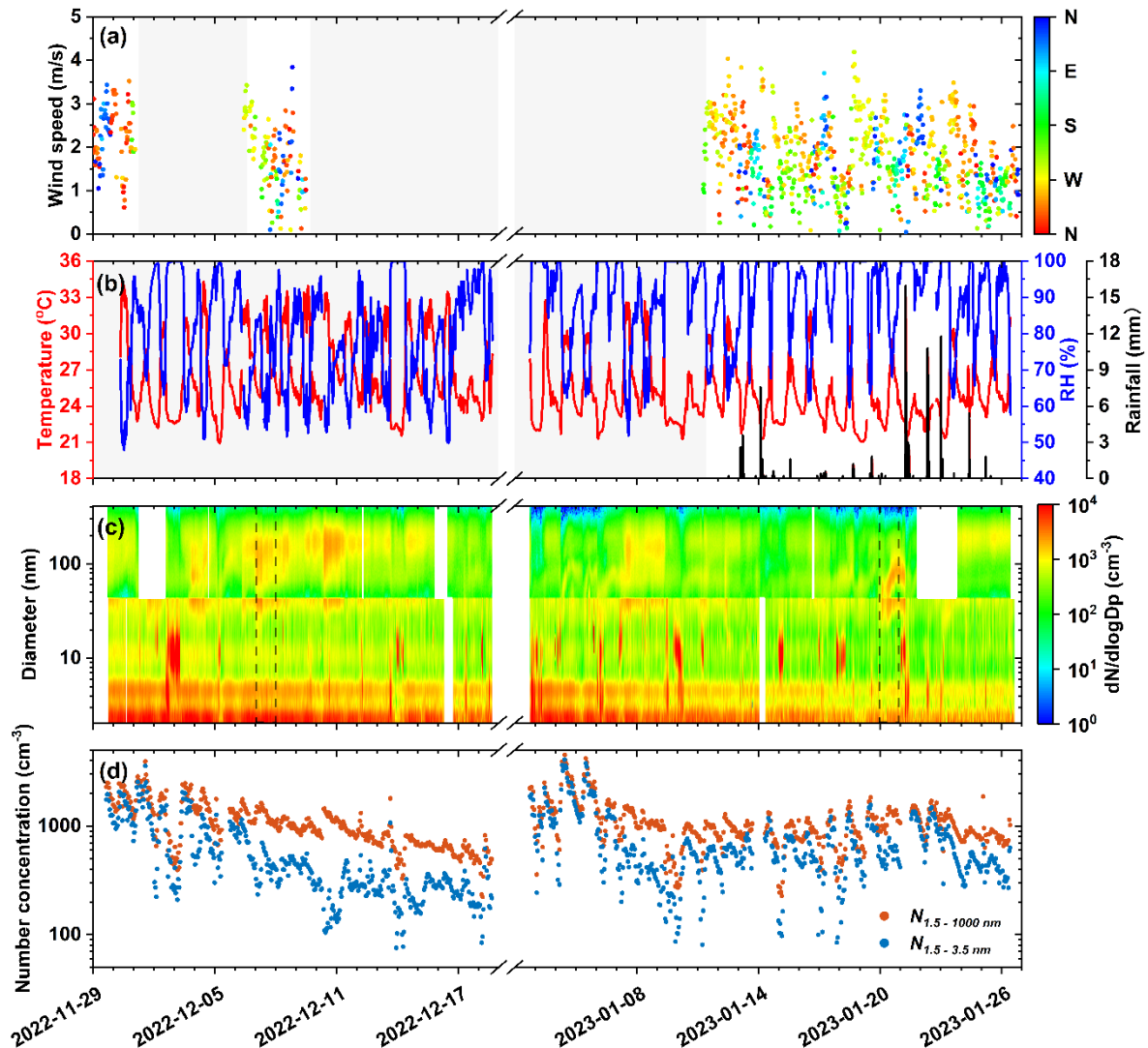


Figure 2. The time series plot of (a) Wind speed and wind direction; (b) Ambient relative humidity (RH), temperature, and rainfall; (c) Particle number size distribution from the NAIS (2-40 nm, negative particle mode) and the SMPS system (40-414 nm); (d) Total number concentration of particles with diameter ranges of 1.5-1000 nm and 1.5-3.5 nm from the PSM measurement. Note that the grey parts in panels (a) and (b) and the white part in panel (c) indicate that no data are available. The two dashed rectangles in panel (c) highlight representative 'Amazonian banana' events observed on December 7 and January 20. The timestamps used here are synchronized with the local time in Manaus, called Local Time (LT), which is equal to Coordinated Universal Time (UTC) minus 4 hours.

#### Comments and suggestions:

**Line 226-227:** What are the criteria to reject the data. In Figure S3, outlier with higher concentrations are also visible for relative humidity values as low as 60% - were these datapoints also rejected. Could a too restrictive rejection of such periods also by mistake reject a NPF event? It would be good to also mention how much data was rejected?

## Responses and Revisions:

Thanks for the valuable comments. We rejected data primarily by manually identifying periods with RH = 100% and visually inspecting the particle number size distributions for needle-like bursts, which are typically associated with rainfall events. This procedure is similar to that described in Wimmer et al. (2018), where data screening was performed by visually checking the surface plots of particle and ion size distributions. Beyond this, no additional manual rejection was applied. Data quality was assessed by following the method recommended by Manninen et al. (2016). In total, approximately 22 % of the data was excluded, when calculating the particle and ions number concentrations.

However, it's important to note that for showing the particle number size distribution in Figure 2c, we still present the full dataset, without executing the above data exclusion rule. There is little chance that we could reject a NPF event by mistake. Furthermore, if a typical NPF event had occurred, it should likely have been captured by the SMPS as well, as SMPS measurements were unaffected by precipitation events.

We have added the following sentences in the revised manuscript (see line 236-239):

“Accordingly, all data potentially affected by precipitation were carefully checked and excluded from the NAIS dataset prior to further analysis. This was done by manually identifying periods with RH = 100% and visually inspecting the particle number size distributions for needle-like burst anomalies typically associated with rainfall events.”

## Comments and suggestions:

**Line 259: December concentration for size-range “large (4-12 nm)” of 491 cm<sup>-3</sup> does not agree with Table 1, where 497 cm<sup>-3</sup> is written.**

## Responses and Revisions:

Thanks for pointing out this mistake. The reviewer is correct, the value should be 497 cm<sup>-3</sup>, as shown in Table 1. We have corrected the text accordingly in the revised manuscript (see line 288-289).

“The corresponding concentrations in December were 931 and 497 cm<sup>-3</sup>, much higher than 558 and 306 cm<sup>-3</sup> observed in January.”

## Comments and suggestions:

**Line 269-271: From Dec to Jan, the median concentration of particles with diameters between 1.5 and 3.5 nm measured with PSM is increasing from 371 to 573. This contradicts the findings with the NAIS instrument, where the concentration in the intermediate (2-4nm) size range is decreasing from 931 to 558. Why is there a contradicting trend from the two instruments covering a comparable size range?**

## Responses and Revisions:

Thanks for pointing this out. We also noticed this discrepancy between the two instruments. While we cannot provide a definitive explanation, several factors may contribute to the observed differences:

1. **Influence of the Corona Charger in NAIS Particle Mode:** The NAIS particle mode relies on a corona charger, which can affect the detection of the smallest particles. As noted by Manninen et al. (2016), the lower detection limit of NAIS is typically between 2 and 3 nm, depending on the corona voltage and the composition of the carrier gas (i.e., ambient conditions). In our study,

the reported 2-4 nm size range may be influenced by this limitation, particularly under high-humidity conditions.

2. **Differences in Sizing Principles:** NAIS measures the electrical mobility diameter, whereas the PSM determines size based on condensation activation-specifically, the Kelvin equivalent diameter. This fundamental difference in measurement principles can lead to discrepancies in reported concentrations for similar nominal size ranges.

Additionally, it is worth noting that the ion mode of NAIS, which is not affected by the corona charger, shows slightly higher concentrations in January, consistent with the data trend revealed by PSM.

We have further explained these two points in the revised manuscript in line 170-173:

“The particle mode of NAIS operates using a corona charger, which can potentially influence the detection of the smallest particles. Moreover, the lower detection limit typically ranging between 2 and 3 nm also depends on corona voltage and ambient gas composition (Manninen et al., 2016). Usually, the results for particles below 2 nm were not used for data analysis.”

And in line 226-228:

“It should be noted that, due to their differing measurement principles, the NAIS reports electrical mobility diameters, whereas the PSM measures condensation activation diameters (Kelvin equivalent sizes).”

***Comments and suggestions: Line 284-285: Where is the number concentration of 397 cm<sup>-3</sup> coming from? It is not one of the values from the Table 1. It should be better explained, how this value was derived. Also: Table S1 lists two values 450 and 610 labeled as “this study”. How are these values derived, since they also differ from the value mentioned in Table 1?***

### **Responses and Revisions:**

Thanks for pointing this out. We apologize for the inconsistency. The value of 397 cm<sup>-3</sup> stated on line 285 was incorrect. The correct number concentration is 491 cm<sup>-3</sup>, as reported in Table 1. Additionally, the concentrations for December and January listed in Table S1 have now been updated to 371 and 573 cm<sup>-3</sup>, respectively. We have corrected these values in the manuscript and carefully double-checked all related values throughout the text and supplementary materials to ensure consistency and accuracy.

The corresponding correction in the revised manuscript in line 313-315 is:

“Under pristine conditions in the Amazon region, the particle number concentration (491 cm<sup>-3</sup>) was notably lower than in megacities (> 8500 cm<sup>-3</sup>) such as Nanjing, Shanghai and San Pietro Capo Fiume (Xiao et al., 2015; Kontkanen et al., 2017).”

**Table S1.** The summary of the sub-3 nm particle number concentration measurements using PSM across different global environments

Location	Time period	Size range (nm)	Concentration* (cm <sup>-3</sup> )	Environmental type	Literature
Helsinki, Finland	Jan 2015 – Dec 2015	1.1 – 3.0	6.0E+03	Urban, city	(Kontkanen et al., 2017)
Nanjing, China	Dec 2014 – Jan 2015	1.1 – 3.0	1.7E+04	Urban, city	(Qi et al., 2015)
Shanghai, China	Nov 2013 – Jan 2014	1.3 – 3.0	8.5E+03	Urban, city	(Xiao et al., 2015)
San Pietro Capo Fiume, Italy	Jun 2012 – Jul 2012	1.5 – 3.0	8.5E+03	Urban, city	(Kontkanen et al., 2016)
Centreville, US	Jun 2013 – Jul 2013	1.1 – 2.1	5.9E+02	Urban, farm/forest	(Yu et al., 2014)
Kent, US	Dec 2011 – Jan 2012	1.3 – 3.0	4.7E+02	Urban, town	
Brookhaven, US	Jul 2011 – Aug 2011	1.3 – 3.0	8.0E+02	Rural, coast	
Puy de Dôme, France	Jan 2012 – Feb 2012	1.3 – 2.5	5.0E+02	Rural, mountain	(Rose et al., 2015)
Hyytiälä, Finland	Aug 2010; Mar 2011 – Apr 2011; Aug 2011 – Sep 2011; Apr 2012 – May 2012; May 2013 – Jul 2013; May 2015 – Apr 2016	(1.1/1.3) – 3.0	1.6E+03	Rural, forest	(Kontkanen et al., 2017)
	April 2014 – April 2020	1.1 – 2.5	4.1E+02	Rural, forest	(Sulo et al., 2021)
Amazonian, Brazil	Dec 2022	1.5 – 3.5	3.7E+02	Rural, forest	This study
Amazonian, Brazil	Jan 2023	1.5 – 3.5	5.7E+02	Rural, forest	This study

\* Median values

### Comments and suggestions:

**Line 329-330:** The described trend of the particles larger than 15 nm (D15-40nm) is very hard to see in the plot - especially for the Dec. period. The scale for the colormap starts at 1e1. However, the colors between 1e1 and 1e2 are not present in the plot. Starting the color scale at 1e2 would help to make it easier to see the mentioned trends.

### Responses and Revisions:

Good suggestion. We agree that the trends of particles in the 15-40 nm range during the December period were not clearly visible due to the colormap scale. Following the reviewer's suggestion, we have adjusted the lower bound of the color scale from 1e1 to 1e2 in the revised Fig. 7 (Lines 497-500).

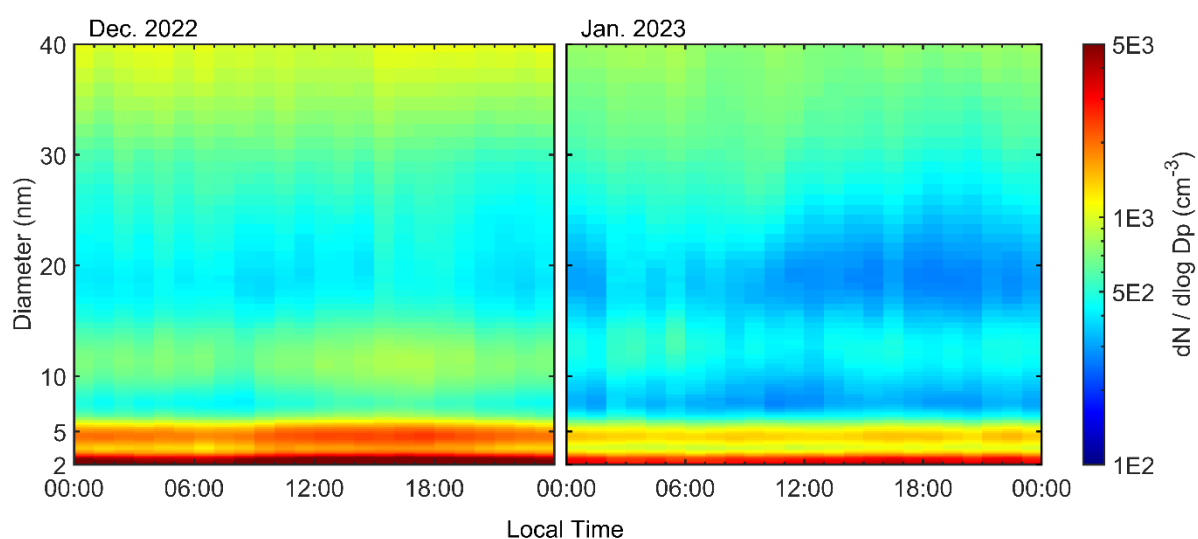
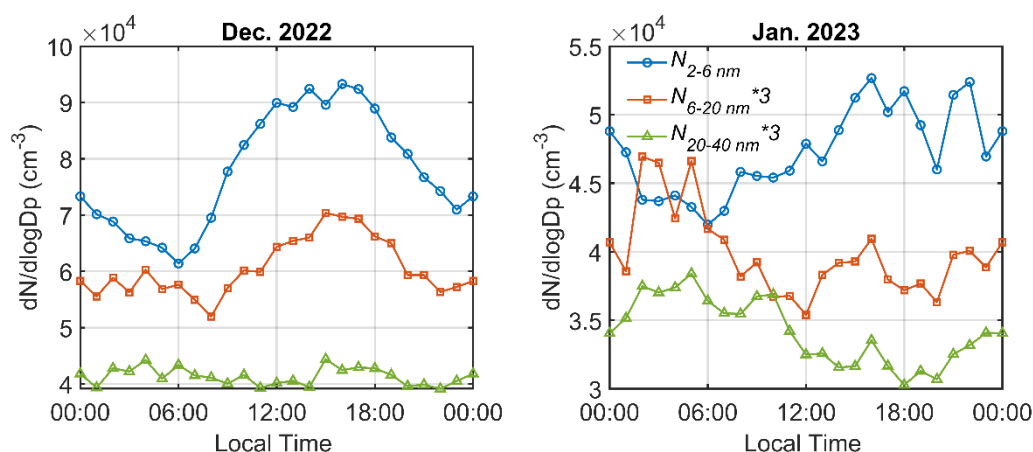


Figure 7. Diurnal variation of the particle number size distribution measured by NAIS during December 2022 (left panel) and January 2023 (right panel). The plot data represent the median values.

Instead of presenting the nucleation mode as a whole, we divide the particles into three size categories: 2-6 nm, 6-20 nm, and 20-40 nm. Similar multimodal particle size distributions have also been reported in previous studies (Zhou et al., 2002; Rissler et al., 2004). To better illustrate the diurnal variation across these size ranges, in the revised Supporting Information we additionally show the diurnal variation of the total particle number concentration within each category, as presented below.





**Figure S5.** Diurnal variation of particle number concentrations in the 2-6 nm (blue), 6-20 nm (orange), and 20-40 nm (green) size ranges measured by NAIS during December 2022 (left panel) and January 2023 (right panel). Note: particle number concentrations for the 6-20 nm and 20-40 nm ranges have been multiplied by a factor of 3 for better visualization.

The corresponding correction in the revised manuscript in line 358-368 is as follows:

“To better illustrate the dynamic changes in particle number concentrations, we separately analyzed particles in the 2-6 nm, 6-20 nm, and 20-40 nm size ranges. Multimodal particle size distributions that correspond to these sizes have been reported in previous studies (Rissler et al., 2004; Zhou et al., 2002). The number concentration for 2-6 nm particles steadily increased throughout the daytime, peaking in the late afternoon for both December and January (see also in Figure S5). Rissler et al. (2004) also observed a pronounced nucleation mode around 16:00-18:00 local time, followed by a decrease and a secondary rise around 06:00-07:00 in the early morning. In December, the concentration of 6-20 nm particles also increased notably from 08:00 in the morning to the afternoon, shortly after the initial rise of 2-6 nm particles. The phenomenon of lagged increasing suggests particle growth processes. In January, particles in the 20-40 nm size range exhibited a continuous increase during nighttime (18:00-24:00), reaching a maximum in the early morning hours. This behavior, however, was not observed in December.”

#### **Comments and suggestions:**

**Line 353-354: Where does the BC mass concentration come from and how was it measured?  
More explanation is required.**

#### **Responses and Revisions:**

Thanks for pointing this out. Clarification sentences have been added to the revised manuscript. The equivalent black carbon (BC) mass concentration was obtained from a Multi-angle Absorption Photometer (MAAP, model 5012, Thermo Scientific), which has been operated as part of the long-term aerosol measurements at the ATTO site (Pöhlker et al., 2018; Saturno et al., 2018). We have now clarified this point in the revised manuscript.

Sentences to add into the manuscript (Line 129-132):

“The equivalent black carbon mass concentrations were obtained from a Multi-Angle Absorption Photometer (MAAP, model 5012, Thermo Electron Group), which is part of the long-term aerosol monitoring program at the ATTO site (Pöhlker et al., 2018; Saturno et al., 2018).”

#### **Comments and suggestions:**

**Line 374–379: “plume” should be changed to “polluted” and “clear” should be changed to “clean”**

#### **Responses and Revisions:**

Thanks for the suggestion. We have revised the wording by replacing “plume” with “polluted” and “clear” with “clean” to improve clarity and consistency in terminology (Line 411-412 and Line 414-415).

“**Figure 10** illustrates the diurnal patterns of the particle size distributions on clean and polluted days. As shown in the left panel of **Fig. 10**, the number of nucleation mode particles is higher on clean days.”

“The diurnal variation observed during polluted days (the right panel of **Fig. 10**) exhibited a pattern similar to that described in **Fig. 7**.”

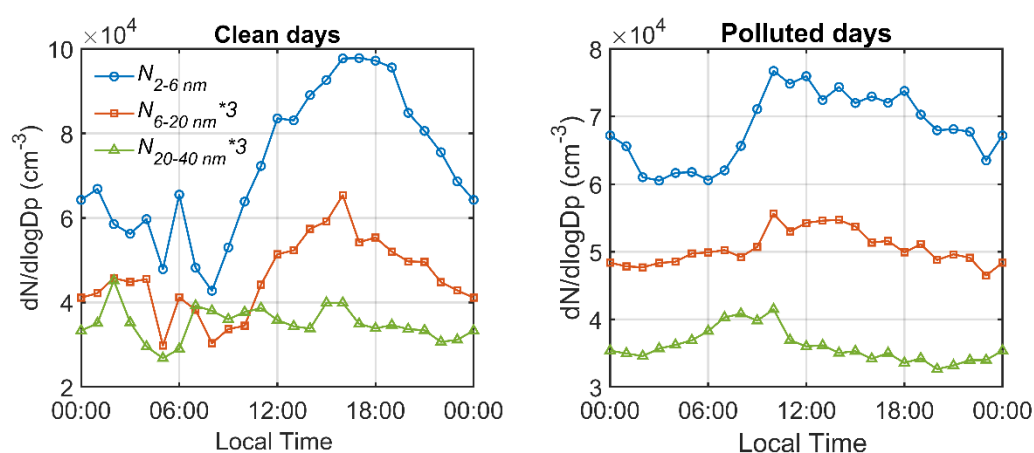
### Comments and suggestions:

**Line 374-375:** It would be good to indicate the time of the large number of nucleation mode particles, since there is also a period with a very low nucleation mode number concentration from approx. 05:00 to 11:00. For Figure 10, also the color scale starts at  $1e1$ . However, a min. value of  $1e2$  would most likely help to see features and trends better.

### Responses and Revisions:

Good suggestion. Instead of showing only the nucleation mode as a whole, we present two particle size categories: 2-6 nm and 6-20 nm. For particles in the 2-6 nm size range, we observed a noticeable concentration increase starting around 08:00 during clean days. For particles in the 6-20 nm size range, both size and concentration increase midday, with a more pronounced enhancement during clean days.

To better illustrate the diurnal variation within these particle size ranges, in the revised Supporting Information we additionally show the diurnal variation of the total particle number concentration for the 2-6 nm, 6-20 nm, and 20-40 nm size ranges, as shown below.



**Figure S6.** Diurnal variation of particle number concentrations in the 2-6 nm (blue), 6-20 nm (orange), and 20-40 nm (green) size ranges measured by NAIS during clean days (left panel) and polluted days (right panel). Note: particle number concentrations for the 6-20 nm and 20-40 nm ranges have been multiplied by a factor of 3 for better visualization.

The sentence has been added in the revised manuscript (Line 411-414):

“Figure 10 illustrates the diurnal patterns of the particle size distributions on clean and polluted days. As shown in the left panel of Fig. 10, the number of nucleation mode particles is higher on clean days. Specifically, the particle concentrations in the 2-6 nm range started to increase around 08:00 (see also in Figure S6), and 6-20 nm particles showed growth and elevated concentrations in the afternoon.”

As suggested, we have also adjusted the minimum value of the color scale in Figure 10 from  $1e1$  to  $1e2$  to enhance the visibility of temporal features and trends (Line 512-515).

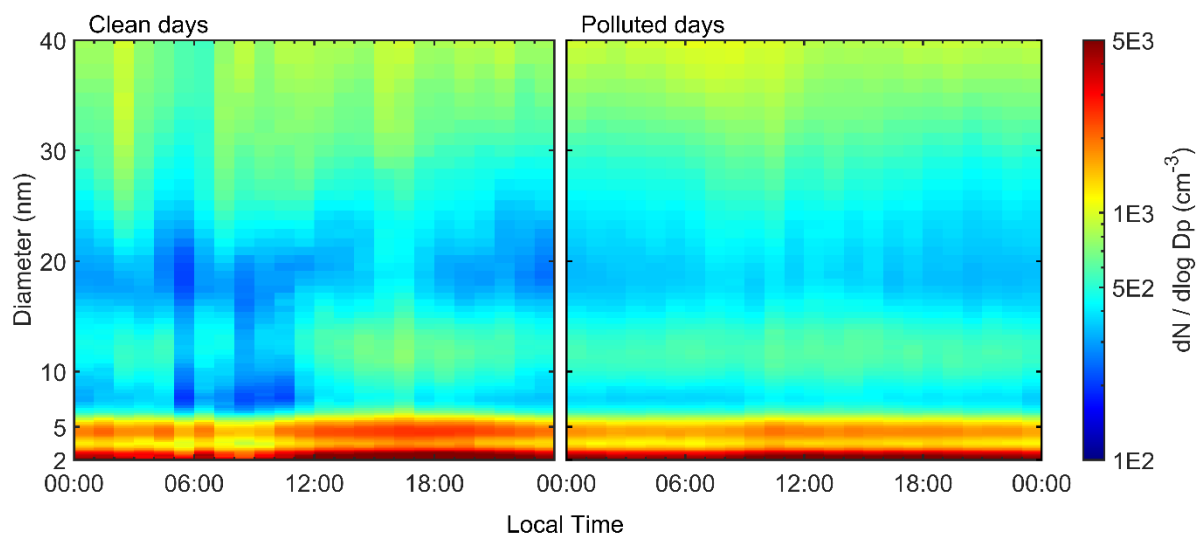


Figure 10. Diurnal variation of the particle number size distribution measured by NAIS during clean days (left panel) and polluted days (right panel). The plot data represents the median values.

**Comments and suggestions:**

**Line 375-376:** “Figure 10a” should be changed to “left panel of Figure 10” and “Fig. 10b” should be changed to “right panel of Figure 10”.

**Responses and Revisions:**

Thanks for pointing this out. We have revised the manuscript accordingly.

The related modifications in the revised manuscript are in Line 411-412 and Line 414-415:

“As shown in the left panel of **Fig. 10**, the number of nucleation mode particles is higher on clean days.”

“The diurnal variation observed during polluted days (the right panel of **Fig. 10**) exhibited a pattern similar to that described in Fig. 7.”

**Comments and suggestions:**

**Line 405-407:** In the “Results and discussion” chapter, many of the sub 10nm findings of this study are compared to measurements reported in the literature. It would be good to specify more precisely which aspect of the paper is the “first-time” presentation.

**Responses and Revisions:**

Thanks for pointing this out.

Several previous studies have reported particle number size distributions below 10 nm in the Amazon region (Wimmer et al., 2018; Rissler et al., 2004; Zhou et al., 2002). However, our measurements are the first example conducted within the forest and above the canopy, providing a more representative characterization of boundary layer conditions. Furthermore, to our knowledge, this is the first study to report sub-3 nm particle concentrations under such pristine conditions in the central Amazon region.

In the revised manuscript, we have added statements to clarify the novelty of this study and emphasize the uniqueness of the measurement results (Line 444-446):

“This study is the first to provide a detailed description of the size distribution and diurnal variation of particles and ions smaller than 3 nm measured above the forest canopy in the central Amazon region, supposed to offer a more accurate representation of boundary layer conditions of the region.”

**Comments and suggestions:**

***Table 1: Since the sizes represented by the different instruments are not all comparable (as mentioned in 217-218) it would be good to indicate, that the sizes reported for PSM are different compared to the sizes reported by the other listed instruments.***

**Responses and Revisions:**

Thanks for the valuable suggestion. We agree that the particle size ranges reported by the different instruments are not directly comparable due to their distinct measurement principles. We have therefore clarified this in the caption of Table 1 by explicitly indicating that the sizes reported for the PSM refer to condensation activation diameters (Kelvin equivalent), while the sizes for the other instruments represent electrical mobility diameters. This distinction has also been briefly explained in Section 3.1 to avoid any confusion for the readers.

One sentence has been added in the revised manuscript below Table 1 (Line 458-459):

“\* PSM measures the condensation activation diameters (Kelvin equivalent), while the sizes reported by the other instruments represent electrical mobility diameters.”

Another sentence has also been included in the main text of the revised manuscript (Line 226-228):

“It should be noted that, due to their differing measurement principles, the NAIS reports electrical mobility diameters, whereas the PSM measures condensation activation diameters (Kelvin equivalent sizes).”

## References

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