We thank the reviewers for their thorough examination of the manuscript and their valuable feedback. We have carefully considered all the comments provided and have incorporated the suggested improvements into the updated version of the manuscript.

Reviewer 2

1. *lines 193-196 need to be rephrased to avoid repeating information. It should also be noted that the nitrate and sulphate species measured by AMS could contain organic nitrogen or organic sulfur. There is a typo in line 197, and the sentence in lines 199-200 is incomplete.*

Response: Thank you for your comment. We improved the writing based on the reviewer comments.

- We rephrased the sentence and have added these lines about the nitrate and sulphate species

The average mass concentration of organic and inorganic aerosols during the entire campaign was 9.6 µg/m³. The bar chart in Fig. 2 shows aerosol fractions, with organic species accounting for more than 70% of the total aerosols. This is significantly higher than the nearest component, sulphate, which accounted for 15%. It should also be noted that the nitrate and sulphate species measured by AMS could potentially contain an organic fraction.

- We corrected the typo
- We rephrased the incomplete sentence

The PMF analysis in this paper primarily focuses on the composition of the organic mass concentration, which is discussed in further detail in Section 3.2

2. *Please add the AMS ion chemical formula when discussing the ions at certain m/z.*

Response: Thank you for pointing this out. We have added the ion chemical formula as suggested by the reviewer and included a reference to the manuscript.

The m/z 85 signal is a well-known oil marker in the AMS mass spectrum, attributed to synthetic esters ($C_5H_9O^+$)

LO-OOA is associated with aromatic fragments at m/z 77 ($C_6H_5^+$), and 105 ($C_8H_9^+$). It presents a high relative intensity (0.13) at m/z 43 ($C_3H_7^+$) (characteristic of LO-OOA) and a lower relative intensity (<0.04) at m/z 91, which is related to toluene ion ($C_7H_7^+$) (Timko et al., 2014; Smith et al., 2022).

MO-OOA is characterized by its notably high relative intensities (>0.18) at m/z 29 (CHO^+) and 44 (CO_2^+), which serve as markers for its identification (Alfarra et al., 2007)

3. *Provide a more detailed description of the two different types of lines in Figure 3.*

Response: Thank you for your comment. Figure 3 description is edited to provide required details according to comments:

A smooth red line is fitted to the data, while the dashed black line represents the value of 0.66, assumed for oil-free organic PM emitted from aircraft engines. The analysis showed that no oil or very little (<5%) oil fraction was detected.

4. *Include the standard deviations of concentrations in Figure 5.*

Response: Thank you for your comment. Statistical details including sd of the obtained factors already tabled in the supplementary material Table S1. We have added this line for clarity and updated Figure 5 along with its caption according to the comments:

Detailed statistics of the obtained factors for the entire campaign are provided in the supplementary material (Table S1)

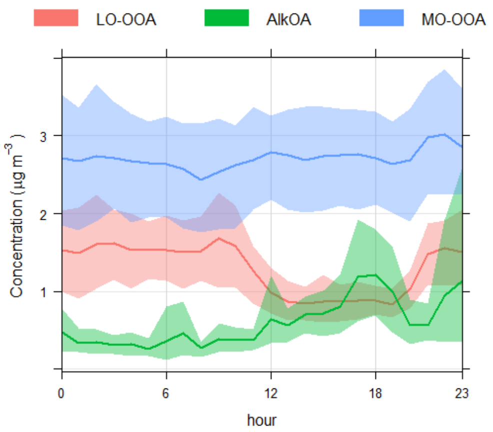

Figure 5. Diurnal pattern of the solved factors from October 8, 2021, to October 23, 2021. The mean diurnal pattern is shown as solid lines, and the shading indicates the 95% confidence interval for the mean.

5. *Lines 305 and 341-345: The authors suggest that AlkOA concentration is associated with aircraft activities because its concentration starts to increase at noon. However, it is evident in Figure S2 that the total number of flights is higher between 8:00 am and 2:00 pm compared to other times of the day, which is not consistent with the AlkOA concentration described in Figure 5. Please provide further details to support the authors' statement and conclusion in this section.*

Response: Thank you for your comment. The AlkOA factor increases between 09:00 and 20:00 with the rise in flight activity. The increase in AlkOA between 22:00 and 23:00 is not statistically significant due to high variability. The discussion of the results has been updated as follows:

The AlkOA factor shows an increase between 09:00 and 20:00 and again between 22:00 and 23:00. Based on the mean diurnal pattern with a 95% confidence interval, the AlkOA factor increases during the 09:00 to 20:00 period, corresponding with peak flight activity (approximately 71% of total flights). Further details on daily aircraft activities are provided in the supplementary material (Fig. S2). The increase in AlkOA between 22:00 and 23:00 is not statistically significant due to high variability (Fig. 5).

6. *Section 3.3: For the correlation analysis of the three PMF factors with other studied pollutants, is the analysis done using the data collected from the whole campaign or the average data from the diurnal variation analysis? If the authors used the one-hour average data from the diurnal variation analysis, I suggest rerunning the analysis using the data from the whole campaign.*

Response: Thank you for your comment. The analysis conducted using data collected throughout the entire campaign. we have added this line for clarity

Data from the entire campaign was used to perform the correlation analysis

7. *Lines 332-333: The authors suggest that the concentrations of BC, NOx, SO_2, and CO could be influenced by meteorological conditions, which might explain the moderate correlation observed between AlkOA and these pollutants. However, given that AlkOA is measured as part of AMS sub-micron samples, it is reasonable to assume that AlkOA would also be influenced*

by meteorological factors. Additionally, since BC is also in the particle phase, the influence of meteorological conditions on both AlkOA and BC should be similar.

Response: Thank you for your feedback. These lines been added to the manuscript for more clarity.

Similarly, AlkOA could potentially be affected by meteorological conditions. Since AlkOA is measured as part of AMS sub-micron particles, it is expected to behave similarly to eBC in the particle phase. Therefore, meteorological conditions likely influence both AlkOA and eBC in a similar manner.

8. *Figures 5 and 6: The authors did not address the previous question about the significant decrease in AlkOA from hour 23 to hour 0, which could be associated with the large standard deviation when averaging the data to study the diurnal variation. I recommend that the authors consider the standard deviation when discussing the diurnal variation if it is large.*

Response: Thank you for the suggestion. Based on the reviewer's comment, Figures 5 and 6, which display the mean diurnal pattern along with a measure of variability, have been updated. These lines have been added to the manuscript for greater clarity.

The increase in AlkOA concentration from 22:00 to 23:00, or the subsequent decrease from 23:00 to 00:00, falls within the variability range of the 00:00 to 01:00 period. Therefore, a statistically significant decrease in AlkOA concentration from 23:00 to 00:00 is hardly measurable. Meteorological factors may contribute to the variability in the diurnal cycle observed during this period. Additionally, unidentified local source such as airport ground service equipment could potentially explain the variability observed from 22:00 to 00:00.

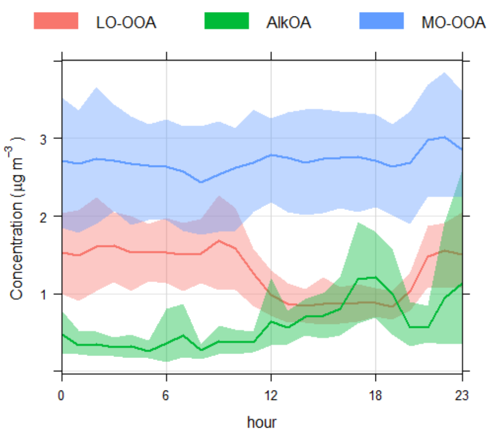

Figure 5 shows the mean diurnal patterns of LO-OOA, AlkOA, and MO-OOA during the measurement campaign, with a 95% confidence interval.

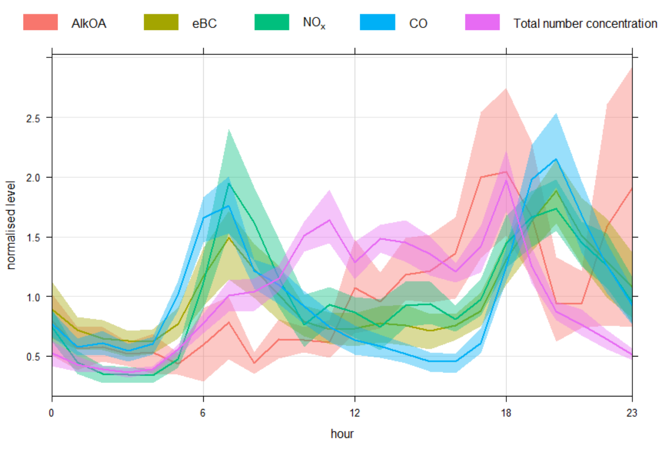

Figure 6 shows the normalized level of AlkOA and trace gases during the measurement campaign, with a 95% confidence interval