Response to the reviewers on EGUSPHERE-2025-648 “Measurement report: Lessons learned from the comparison and combination of fine carbonaceous aerosol source apportionment at two locations in the city of Strasbourg, France”

We thank the editor and the reviewers for their constructive advice and comments on our manuscript. In the following, we respond to all reviewers’ comments using a black font for original review comments, green font for authors’ responses, and blue font for changes in the revised version.

#Referee 3

The study by Chebaicheb et. al, provides a standard report of fine aerosol measurements using a combination of ACSM/aethalometer instruments. In terms of the single vs. combined PMF comparison, a solid job has been done, which is more about the measurement technique. In terms of scientific contribution or novelty, I see an interesting discussion on "amine-related OA" factor. With the exception of this, however, the results are fairly standard compared to previously published similar work. For this reason, I recommend even further data exploitation in a situation when two ACSM/AE33 were measured in parallel within the same city. My comments are following.

We thank the reviewer for the positive and constructive comments.

1) Can you present the concentration ratios of the time series between ACSMs to identify which species or m/z are significant for either station even if the distance between sites is not large?

The scatter plots between ACSM#1 (Clemenceau) and ACSM #2 (Danube) for each species (OA, SO4, NO3, NH4, eBCff, and eBCwb), (the b values represent the slopes) are given below and have been added to the supplement (Figure S4). Differences in these time series have been discussed in section 3 of the main text: “The average mass concentrations of NR-PM1 species and eBC presented in Table 1 showed only slight differences between the two sites, with overall higher levels at the Clemenceau site. This could be attributed to the proximity of primary exhaust and non-exhaust emissions from road traffic as well as more intense condensation and coagulation processes. It should also be noted that the environment of the Clemenceau station is more urbanized (city center) compared to the Danube site, which may also partly explain these observations. OA is associated with the highest concentrations at both sites - with values of 4.0 µg m-3 and 4.3 µg m-3 at the Danube and Clemenceau sites, respectively - reinforcing the interest in the apportionment of its main sources. The second main compound at both sites was nitrate, with concentrations about 20% higher at Clemenceau compared to Danube. The differences in sulfate and eBCff concentrations are about 15 % on average (with the highest

concentrations still observed at Clemenceau). Complementarily, results from offline analyses performed on filters collected in February 2020 indicate slightly higher concentrations for Clemenceau (Table 1). Surprisingly, however, filter-based levoglucosan analyses indicate similar concentration levels at both sites while eBCwb appears to be about 40 % higher at Clemenceau, and the comparison of OA mass spectra averaged over the study period also indicates significantly higher signals for the highest m/z's, including common wood-burning tracers (see Figure S3), at Clemenceau.".

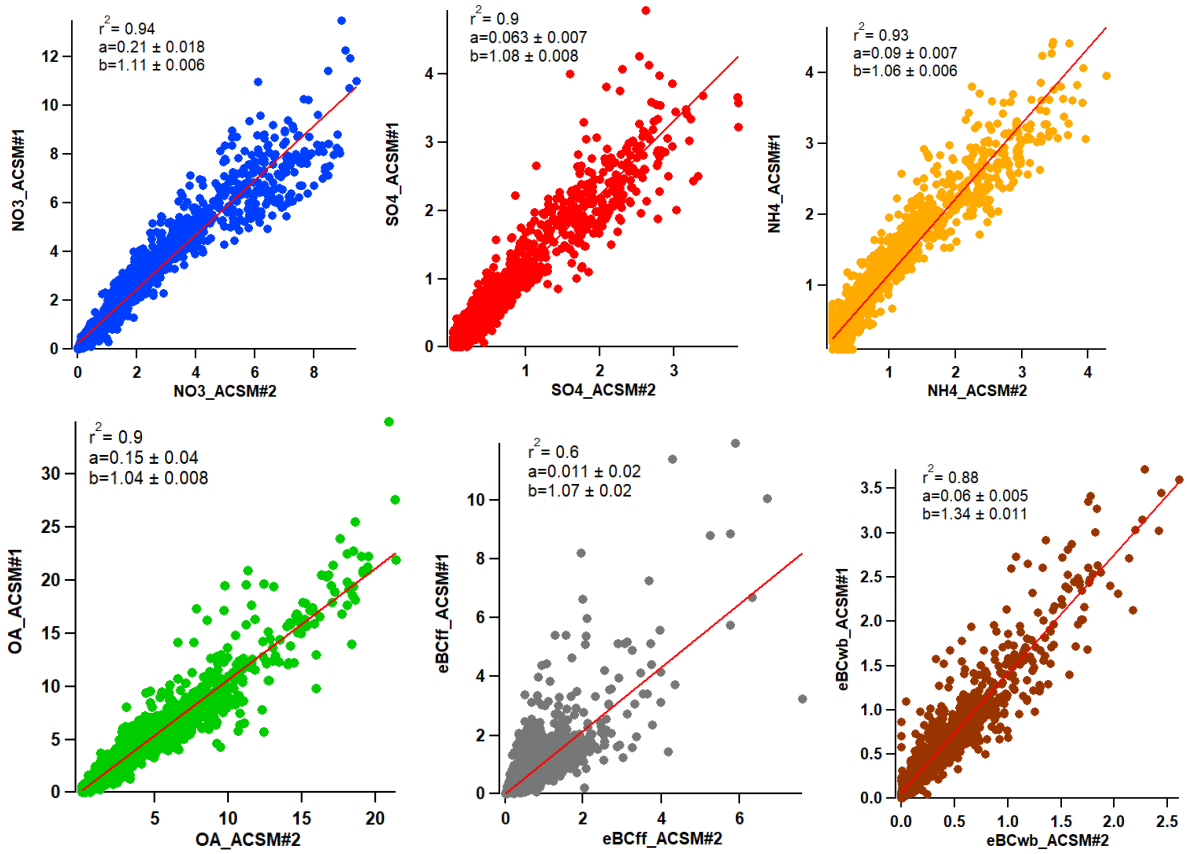
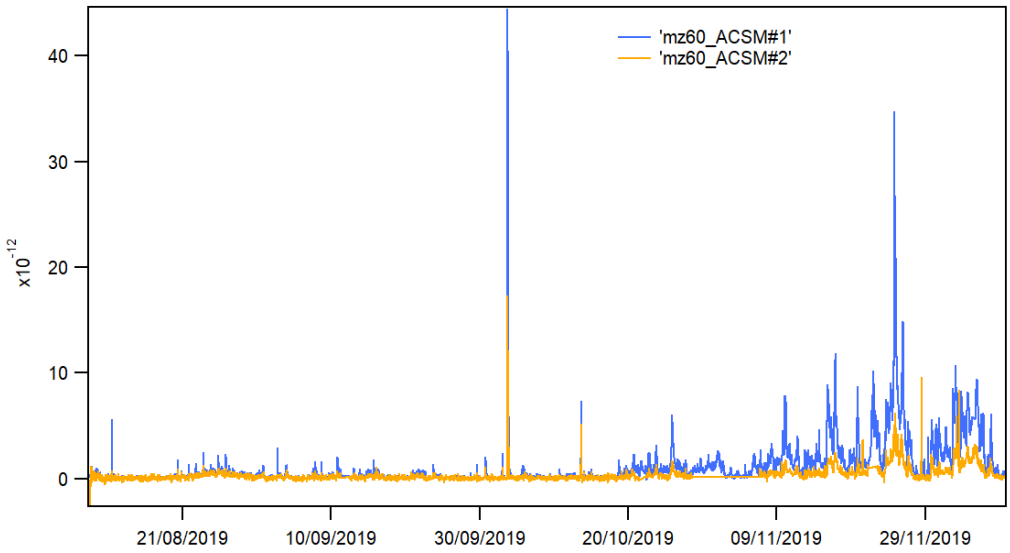


Figure S4: Scatter plots between ACSM #1 (further deployed at the Clemenceau site) and #2 (deployed at the Danube site) for the chemical species (OA, NO3, NH4, SO4, eBC_{ff} and eBC_{wb}) (the b values represent the slopes).

2) In context of previous comment, the concentration difference in m/z 60 (Fig.S14) looks like an interesting result if we take into account a fairly small distance between these two sites. It probably indicates some close source of fresh emissions from biomass burning. Is this plausible at Strasbourg? When you comparing the instruments against each other (Aug-Oct 2019, Fig.S1), how did the m/z60 comparison come out? If the pre-campaign comparison was the same for m/z60, I would add this figure to the main text and expand discussion on a possible specific source in the vicinity of Clemenceau site.

We compared the m/z60 concentrations during the period (August-October 2019, in Metz) (see figure below), showing higher m/z 60 concentrations with ACSM#1 as discussed in the main text, section 2.2: "As a matter of fact, the few m/z ratios showing the highest concentrations for the under-estimating instrument – which was further installed at the Clemenceau station during the wintertime Strasbourg campaign – included m/z commonly attributed to biomass burning OA (in particular m/z 60 and 73, see Fig. S3)."



3) L. 370, authors state: "A factor profile associated with amine-OA and a specific daily profile are consistent with an industrial source. This factor could therefore be associated with an industrial source of OA." Can you be more specific and maybe even hypothesize about a specific industrial source of this factor? If you know wind direction (Fig.S16) and also that it is a local source, it might not be a problem to pick out something specific. It would be helpful for information if a similar source appears in other papers.

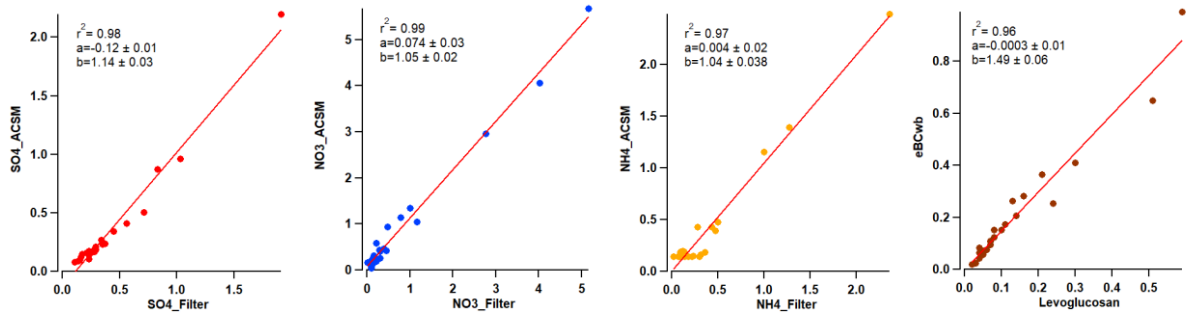
This comment is addressed as follows in the revised version:

"Upon examining the emission inventory, we found a significant amount of particulate emissions linked to an industry zone, which aligns with the pollution roses. Although we found almost no info on the processes used in that type of industry, it seems polyamines are used in the production process of asphalt production as an example (as indicated in the Chinese patent, https://patents.google.com/patent/CN102604125B/en)."

4) In Fig.S4 is a comparison with OC and EC measured on the filters. The agreement is very good. Can you add a similar comparison of filters vs. ACSM concentrations for SO4, NO3 and NH4, and also the discussed comparison of Levoglucosan vs. eBCwb?

We thank the reviewer for this comment. We have added the graphs below comparing the filters and the ACSM/AE33 for the Danube and Clemenceau sites to the Supplement (Figure S6) with this paragraph: "The results for ACSM species (SO_4, NO_3, and NH_4) showed very good correlation coefficient values ($r^2 > 0.9$) for both sites, with ratios of approximately 1 for the Danube site and ratios of approximately 1.2 and 1.3 for the Clemenceau site, showing a good agreement between ACSM chemical species and offline measurements. For the eBCwb vs. levoglucosan comparison, the differences are important with a ratio of 1.5 for the Danube site and around 2.5 for the Clemenceau site. This can be explained by both emission sources and the methodological separation of eBC fractions. As Clemenceau is a traffic-dominated urban site, the separation between eBCwb and eBCff is not always well-defined, leading to potential overestimation of eBCwb and higher eBCwb/levoglucosan ratio.".

Danube



Clemenceau

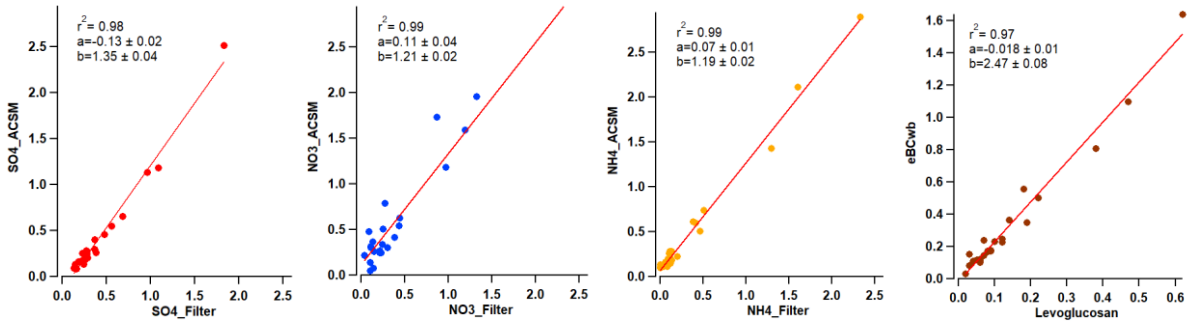


Figure S6: Scatter plots of ACSM/AE33 species vs. offline measurements for both Strasbourg sites: Danube and Clemenceau.

5) 3: Can you set the same range on x-axis (time)? It would be better for visual comparing of time series with each other. I also suggest to add Fig.2 on top of Fig.3.

As proposed, we have defined the same range on the x-axis for Figure 3. However, the suggestion to add Figure 2 above Figure 3 cannot be implemented, as Figure 2 is included in section 2.5 and Figure 3 in section 3.

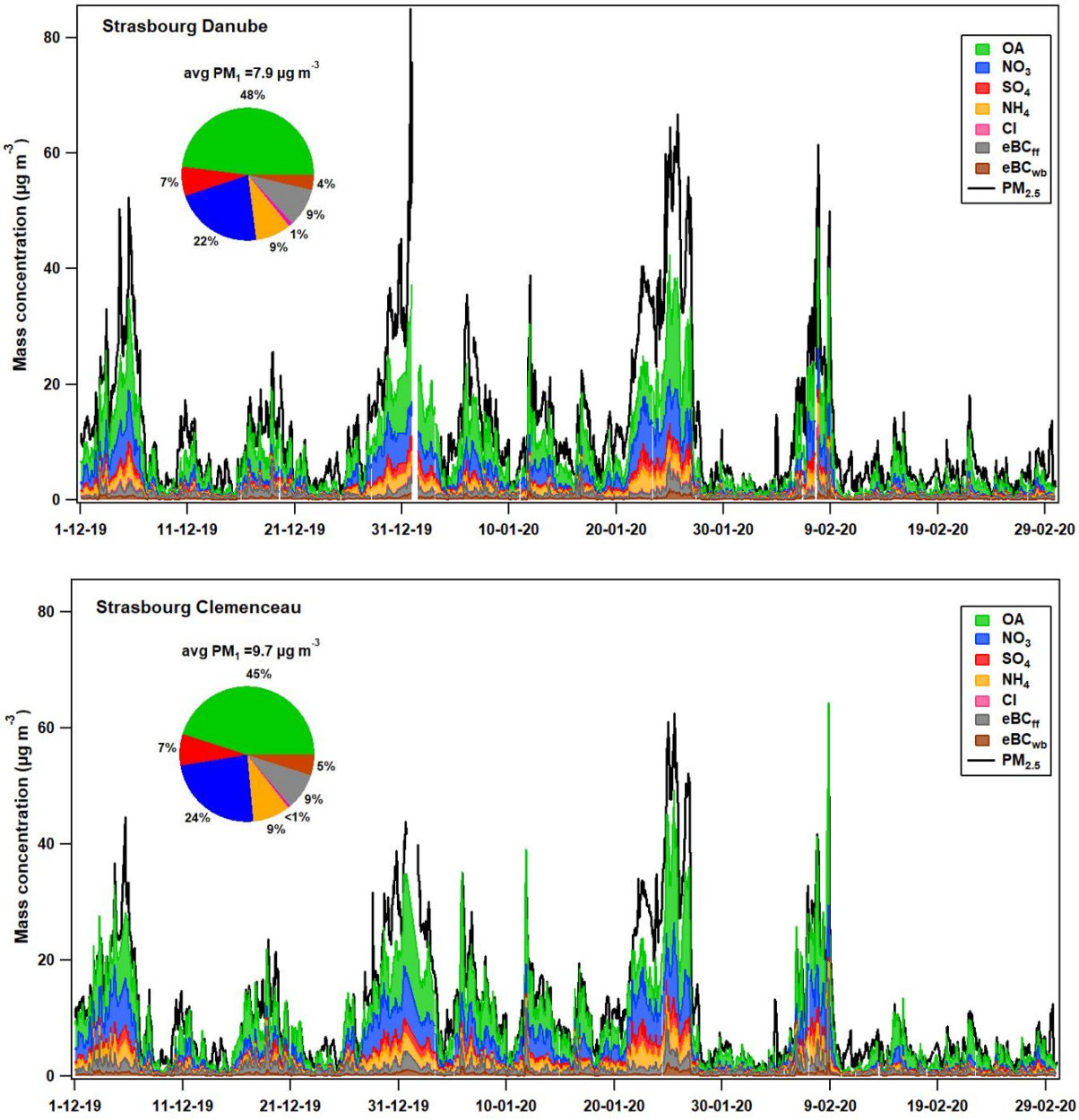


Figure 3: PM_1 species at the Danube (top) and Clemenceau (bottom) sites during the studied period.

6) S1 in supplement can be extended by intercomparison of aethalometers prior to the Strasbourg campaigns.

For the campaign conducted in Metz prior to the one in Strasbourg, we did not cross-compare the AE33s, but only the ACSMs.