

We are thankful for the discussion on the manuscript provided by the reviewer. Please, find our responses to each point below.

## Reviewer 2

Pereira et al. present observations of organic aerosol mass concentration and chemical composition from aerosol collected on filters during a summer field study in Paris. They used EC/OC Sunset and high resolution mass spectrometry for the mass concentration and composition, respectively. The authors found similarities and differences in the mass concentration and composition between Paris and a rural site, suggesting these similarities are related to transport and urban influences on rural chemistry while differences indicate localized chemistry. The authors have done a thorough job addressing concerns from both reviewers.

1. The remaining concern is with Sect. 3.3 and the correlation table. Some of the descriptions are confusing, e.g., line 494 in that CHO compounds can undergo O<sub>2</sub> oxidation (unclear how this would be done) or that positive correlation (line 497 - 498) and negative correlations (line 501 - 503) both mean that they were involved in similar chemistry. Similarly, NO<sub>x</sub> in of itself is not a direct oxidant of gases. I recommend the authors generally soften the language in what the correlations means for these different comparisons and potentially look more into if the correlations actually corresponds to a mechanistic aspect (is T increasing or decreasing the compound through evaporation or chemistry), a chemical reactions (are the compounds produced in photochemistry along with O<sub>3</sub>), co-emitted, or needed in the reaction (is presence of NO needed to make certain functional groups while the presence of NO may inhibit other functional groups).

Thank you for the comment. We explore and discuss the correlations between the meteorological conditions and chemical composition as a qualitative description. We clarified this point at the beginning and at of the section and rewrite the text to soften some of the observations to address the reviewer concerns:

Lines 449-450 have been added into the manuscript: This sections explores possible correlations and considers the influence of meteorological conditions observed during the campaign on the OA chemical composition.

Lines 465-474 have been rewritten: Positive correlations between NO<sub>x</sub> concentrations with the percentage number of molecular formulae for CHON ( $r = 0.56$ ,  $p\text{-value} = 0.05$ ) and the aromatic subgroup ( $r = 0.68$ ,  $p\text{-value} = 0.01$ ) were observed in Paris. This was not the case of the other chemical families as NO<sub>x</sub> was negative correlated with the percentage number of formulae for CHOS, CHONS and unsaturated types. While positive correlations can highlight the role of NO<sub>x</sub> into the formation specific groups, the negative correlations can suggest an inhibition effect. Anthropogenic pollutants has been shown to influence the formation of organonitrate compounds (Lim et al., 2016). Also, nitro-aromatic compounds formation in the presence of NO<sub>x</sub> was reported by Sato et al. (2022). Possible mechanistic pathways for those groups can derive from CHO compounds oxidation, forming alkylperoxy radicals (RO<sub>2</sub>·), and subsequent NO<sub>2</sub> addition or NO reaction, leading to the formation of N-families (e.g., organo-nitrate, peroxyxynitrate) (Atkinson, 2007; Kroll and Seinfeld, 2008). The correlations observed are consistent with the different roles of anthropogenic pollutants reported in the literature (McFiggans et al., 2019; Shrivastava et al., 2019).

Lines 512-514 have been added in the manuscript: The correlations observed suggest a potential link between the meteorological parameters, anthropogenic pollutants and the OA composition, however; further research is needed to fully understand the extent of this impact.

2. Further, I recommend the authors follow the authors' guideline for concluding section ([https://www.atmospheric-chemistry-and-physics.net/policies/guidelines\\_for\\_authors.html](https://www.atmospheric-chemistry-and-physics.net/policies/guidelines_for_authors.html)), where the results are compared with previous studies and placed into context of this new study, caveats and limitations are addressed, and implications for the results are discussed.

Following the reviewer suggestion, we have added the following lines in the conclusion of the manuscript.

Lines 573–577: These observations provide the first HRMS molecular screening analysis for the Paris region, improving the understanding of OA composition and the differences and similarities between urban and forested areas. However, further information is needed at comparing the chemical composition in different environments in a quantitative way to properly assess the mixing between air masses and their global impact in modelling and air quality studies.