

Atmos. Chem. Phys. Discuss., referee comment RC1  
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## Comment on acp-2021-393

Anonymous Referee #1

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Referee comment on "Annual exposure to polycyclic aromatic hydrocarbons in urban environments linked to wintertime wood-burning episodes" by Irimi Tsiodra et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-393-RC1>, 2021

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This manuscript presents a database focused on polycyclic aromatic hydrocarbons (PAHs) from a year-long sampling campaign in Athens, Greece. This dataset, together with other chemical markers, was combined with receptor modeling to obtain some insights into sources and contributions to the health risks. Although there are hundreds (or even thousands) of papers published on PAHs, this combined strategy is new and has made it possible to estimate the astonishing contribution of residential biomass burning to the measured levels and estimated risks. Therefore, this study can serve as a basis for forcing policy makers to implement measures. Due to its interest for the scientific community and for stakeholders, this article deserves to be published in ACP, after review.

Specific comments:

The writing of a scientific article must be impersonal. Example: "It was found that biomass burning" instead of "We find that biomass burning". Check the entire manuscript.

There are many typos throughout the manuscript. A careful review is required.

Abstract. "responsible for annual mean PAH concentrations (31%) comparable to those from diesel/oil (33%) and gasoline (29%) sources." The sentence speaks of concentrations, but in parentheses percentages are mentioned that, I suppose, represent contributions from sources. Rephrase the sentence to make it clearer.

Section 2.2. How was the sampling schedule? Every 3 days? One day each week? Four-

day air mass back trajectories, arriving at Thissio at 1000 m, were calculated. Why 1000 m? At what altitude is the sampling site located?

Section 3.1. Apply statistical tests to compare means between seasons and to assess if there are significant differences and to define confidence levels. How do you explain the difference in concentrations between Dec2017/Jan2018 and Dec2016/Jan2017?

Partitioning of PAHs between gas and particle phases was not discussed. Concentrations of many PAHs, especially LMW species, are in reality much higher than those measured in the present study, which only include the condensed form. It should also be borne in mind that PAHs suffer photochemical reactions leading to the formation of nitro- and oxy-derivatives. Authors should look for correlations with ozone and NO<sub>x</sub> concentrations provided by the air quality measurement network to better interpret the results obtained.

End of page 12. Non-local contributions were associated with trajectories from the Black Sea area, where "extensive summer agricultural burning has been identified". Legislation within the EU has largely outlawed the practice of field burning agricultural wastes, especially in summer. Authors must make sure that it is agricultural burning or wildfires. For this purpose, fire maps and emission inventories by EMEP/EEA (which include emissions from agricultural burning) should be consulted.

Conclusions. I'm not sure about the promotion of electromobility. While exhaust emissions would decrease, non-exhaust emissions would, on the contrary, increase. Heavier battery electric vehicles may result in more tyre/brake wear and resuspension emissions than the current vehicle fleet. Several recent studies have shown that non-exhaust emissions are at least as toxic as those from exhaust emissions. One thing is for sure ... The use of public transport instead of individual transport should be promoted.