

Interactive comment on “Characterization of primary and aged wood burning and coal combustion organic aerosols in environmental chamber and its implications for atmospheric aerosols” by Amir Yazdani et al.

Anonymous Referee #2

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The manuscript by Yazdani et al. describes the analysis of chamber and ambient biomass burning aerosol. They use two complementary techniques (mid-infrared spectroscopy and aerosol mass spectrometry) to gain insight into the chemical composition of these aerosols as a function of fuel type and aging with hydroxyl and nitrate radicals. This work is a valuable contribution to the literature. After addressing the comments below, I believe this manuscript can be considered for publication in Atmospheric Chemistry and Physics.

General comments

Additional details regarding the chamber setup should be added to the main text and/or the supplement. For example, what wavelength were the UV lights? What impact would these lights have on aerosol aging? What were the concentrations of NO₂ and O₃ injected into the chamber? What was the source of these gases?

A lot of effort is put into the PCA, but section 3.5 does not provide any overall conclusions. There are conclusions about the relationship between PCA and functional group analysis presented in section 4 that I did not reach from my reading of section 3.5. These conclusions could be presented or discussed more explicitly in section 3.5.

In the discussion of biomass burning tracers, the authors do not mention K+. In proposing a new approach to tracing biomass burning organic matter, context (even if brief) should be provided for the utility of the new approach compared to all other commonly used tracers.

Comparisons between the PM samples collected from the atmosphere and the chamber experiments should be approached with caution. There are several differences between chamber and ambient aerosols that could impact organic aerosol composition, such as different particle size fraction (PM₁ vs PM_{2.5}), different fuels, aging conditions, etc. For example, the statement on lines 440-442 about PAHs is highly speculative. Another possible explanation is that conditions in the real environment were not as conducive to PAH formation as were the conditions in the chamber burns.

Specific comments

Line 30: The phrase “ever-increasing importance” is hyperbole. I suggest re-phrasing to “increasing importance”

Line 53: The abbreviation for electron ionization is EI

Line 54: typo in polytetrafluoroethylene. Throughout the manuscript, both “Teflon” and PTFE are used. I suggest eliminating the brand name of Teflon and using polymer names.

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Figure 3. This figure is difficult to read and interpret. Increasing the size of lines and text would be useful. The multi-colored molecular formulas are confusing—does the extent of each color reflect something about the extent of contribution of each PC? Additional explanation would be useful.

Figure 6. The two colors of grey for the primary and aged chamber aerosol are difficult to distinguish. It also appears that the line for one of them is dashed, though in the legend both lines are solid.

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