Reviewer #3

The study utilized two methods, namely the aerosol mass spectrometer (AMS) and the extractive electrospray ionization time-of-flight mass spectrometer (EESI-TOF), to investigate the molecular composition of primary organic aerosol derived from various solid waste sources. The study also reported emission factors and presented spectra obtained from the AMS and EESI-TOF instruments. While the article is well-written, there are some areas that require improvement before publication.

We thank the referee for the valuable comments which have greatly helped us improve the manuscript. We will have the reviewer comments in black, address the comments in blue, and modified sentences in blue and italics.

1. The title and abstract/keywords suggest a desire for insights into the molecular-level composition and markers. Although Section 3.4 briefly discusses individual markers, the discussion seems disconnected from the figures and tables and is not adequately reflected in the abstract and conclusion. Enhancing the presentation and discussion of these markers would make the work more captivating.

    Response: To enhance the presentation and discussion of the markers for the use of source separation as we aim for, a figure as Figure S6 in the SI and the corresponding discussion on line 394 to line 404 in the main text.
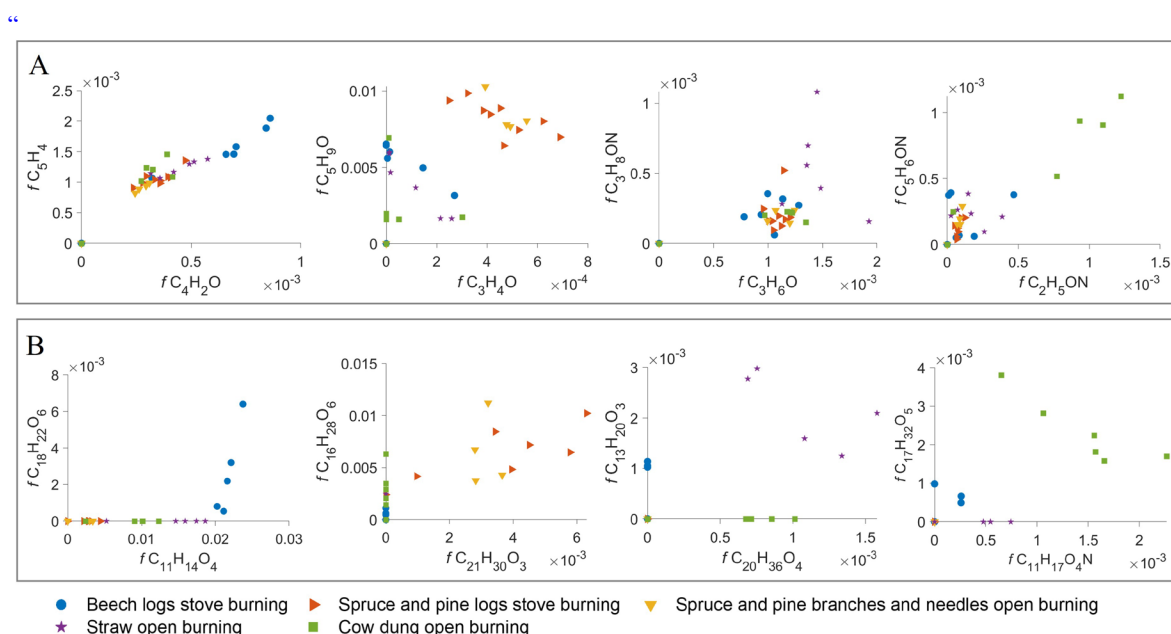
    "

Figure S6. The scatter plots of marker ions from (A) AMS and (B) EESI-TOF.

From the perspective of source-apportionment, ions that are primarily associated with a specific emission source and exhibit minimal contribution from other sources can be considered as potent in use. To show the ability of these markers for source separation, the contribution of two markers for the same source from Table S2 and Table S3 that possess small p-value with high FC are plotted among studied fuels. As shown in Figure S6, these markers measured by the AMS have relatively higher contribution in one specific fuel, which makes the fuel distinctive from others. Nonetheless, one would need to coordinate with more tracers to draw a conclusive diagnosis because the presence of these markers in other fuels. Given this scenario, the markers that have significantly low contribution (FC < 1) in a specific fuel could shed the lights on. In contrast, markers observed from the EESI-TOF is more practical for utilization as most of them are unique. As the markers listed in Table S2 and Table S3 are many, we could not thoroughly discuss here. However, due to the limited fuel types, referencing more markers can provide more confidence in source identification."

2. Most of the figures predominantly focus on the overall composition in a statistical manner. It would be helpful if the authors elaborate on whether they consider the composition or individual molecules more important for source apportionment. This clarification would enrich the paper.

Response: The regarding concern has been elaborated in our conclusion section as follows on line 448 to line 458.

"Future studies will probe the usefulness of these markers, if they are long lived enough in the atmosphere to provide useful separation between complex emission sources shown here. This will either focus on online measurements in polluted regions or from offline filter analysis from similar regions. Clearly, the dominant biomass burning markers (levoglucosan and others) are not robust to be used to separate different biomass sources, though they are robust for identification of general biomass burning aerosol. Nitrogen containing compounds emitted from cow dung emissions can provide a very unique set of markers for separating this source from other biomass sources. Additionally, resin acids from observed in the emissions from spruce and pine emissions provide unique species associated with these emissions (and observed previously).

At the present moment, to provide insight into the usefulness of these markers within the context of ambient measurements, or against source apportionment methods, we would require a robust dataset of comparable data to test these markers and average emission profiles against."

3. Although the introduction mentions the possibility of using Positive Matrix Factorization (PMF) for data analysis, it was not employed in this study. Are there any plans to utilize PMF for analyzing this dataset? This aspect could be addressed to provide a clearer understanding.

Response: The PMF mentioned in the introduction is an important approach to utilize the result of this study in the ambient measurement, as it uses characteristic ions from mass spectra to diagnose the sources of ambient aerosol. For the single-source static data studied in this paper, PMF is not applicable. The following sentence has been added in the conclusion to clarify this on line 456 to line 458.

"At the present moment, to provide insight into the usefulness of these markers within the context of ambient measurements, or against source apportionment methods, we would require a robust dataset of comparable data to test these markers and average emission profiles against."

4. On page 6, line 204, the reasoning for excluding the mass spectrum of plastic bags burning is not convincing. The statement suggests that the observed CxHyOz family in the spectrum (23%) is more likely due to emissions remaining in the tubing from other fuels rather than from the plastic bags themselves, given that polyethylene is their main component. It would be valuable to include the results of plastic bag burning in the main figures and provide further explanation regarding the expected products from burning plastic bags.

Response: The mass spectrum of plastic bags burning has been included in Figure 1 after correction. The correction has been explained in the supplement as follows (Line 11 to 23).

*"**Plastic bags burning emission correction.** In three out of four plastic bags burning experiments, the mass spectrum at the middle to end burning stages had considerable $C_xH_yO_z$ family contribution (~23%). It is unlikely from the plastic bags, given the fact that polyethylene is the main component of plastic bags, but from the emission of other fuels remaining in the chimney. As the combustion progressed, the chimney was heated, and the volatile substances remaining on the chimney evaporated and were then partitioned to the particles for detection. However, at the early stage, before the chimney got hot, the mass spectra consisted mainly of hydrocarbons (see Figure S2a). Therefore, we take only the early burning stage of these three burning experiments into account for the average mass spectrum in Figure 1(f). The absolute concentration of the three AMS mass spectra derived from the early-stage burning is scaled to the uncontaminated burning experiment ions based on m/z 81 and m/z 83, which are stable and characteristic for hydrocarbons. The difference on average is 0.4% ± 1.0% which is very minor as shown in Figure S2b. The mass spectra of three contaminated burning over the whole burning stages indicate that the measured organics was 14.6% ± 8.7% overestimated. Correspondingly, the emission factors for PM and OM are corrected for each plastic bags burning.*
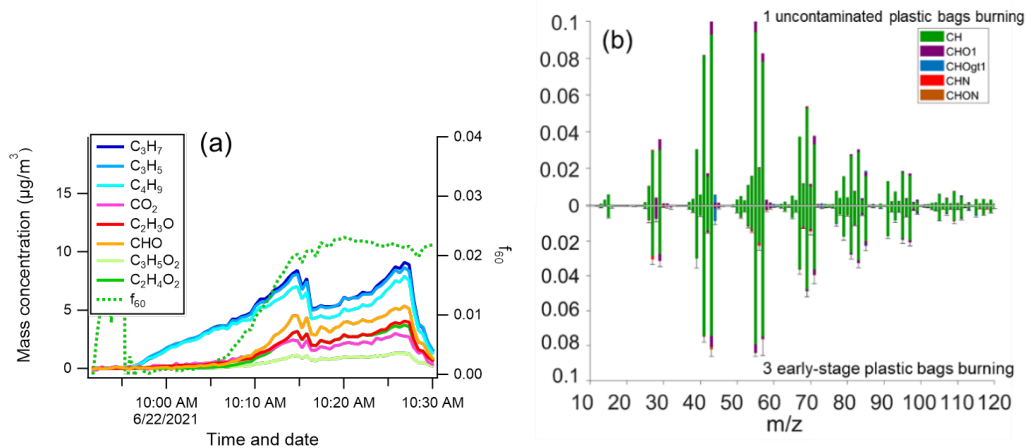
Figure S2 (a) The time series of some ions measured by the AMS during the plastic bags burning for the contaminated case; (b) the mass spectrum comparison of uncontaminated plastic bags burning experiment at the top v.s. the average of 3 early-stage burning at the bottom."

5. On page 11, line 402, the statement "the markers identified by the AMS have greater replicability and by EESI-TOF are more distinctive, thus providing an important reference for the source apportionment" lacks clarity. Please rephrase this sentence to enhance its meaning.

Response: It is explained in Lines 327-331 in Section 3.4 in the original manuscript. It has been rephrased as below on line 438 to line 440.

"*The markers identified by the AMS have greater replicability indicated by the smaller p-value, and by EESI-TOF are more distinctive which can be seen from the higher FC. Therefore, the employment of both provides an important reference for the source apportionment.*"