

Interactive comment on “Molecular markers of biomass burning and primary biological aerosols in urban Beijing: Size distribution and seasonal variation” by Shaofeng Xu et al.

Anonymous Referee #1

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The manuscript by Xu et al. investigated molecular markers of primary biomass burning and biological aerosols during different seasons in Beijing, with focuses on size distribution and seasonal variation. Four sets of ambient aerosol samples were collected for each season using a nine-stage cascade impactor sampler, leading to a total of sixteen sets of samples for the entire measurement period. The samples were analyzed for anhydrosugars, sugar alcohols and sugars. Based on the measurement results, the authors discussed the abundances, seasonal variations and size distributions of these compounds, then estimated the contributions of biomass burning, plant debris and fungal spores to OC. In principle, the topic of this manuscript falls within the scope of Atmospheric Chemistry and Physics. However, I could not support its

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publication due to the following concerns.

1. There have been many previous studies investigating the concentrations of saccharides in Beijing aerosol (e.g., Liang et al., *Chemosphere*, 2016, 150, 365-377). Although these studies typically relied on PM_{2.5} and/or PM₁₀ rather than size resolved samples, they generally covered much more sampling days than the present study, and therefore much more representative when discussing the abundances and seasonal variations of saccharides as well as when estimating the contributions of biomass burning, plant debris and fungal spores to OC. Compared to the results from previous studies, are there any new findings in Sections 3.1, 3.2 and 3.4? Maybe the authors should focus on the size distributions of saccharides, which may be able to differ the present study from previous ones.
2. It is completely unclear how the haze, non-haze and dust-storm periods (which were frequently mentioned throughout the manuscript) were identified.
3. Considering the formation and evolution processes of haze events in Beijing (which could be fast; e.g., Sun et al., *Sci. Rep.*, 2016, 6, 27151), it is questionable whether the so-called haze samples were representative (recalling that only four sets of samples were collected for each season).
4. Please clarify why dust storm is a major source of OC in coarse particles. This point was presented as a conclusion but was not clearly explained in the manuscript.
5. A minor point. Page 6, Line 28. Please check the two ratios cited here.

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