

## ***Interactive comment on “Large contributions of biogenic and anthropogenic sources to fine organic aerosols in Tianjin, North China” by Yanbing Fan et al.***

### **Anonymous Referee #1**

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Comments to Fan et al., Large contributions of biogenic and anthropogenic sources to fine organic aerosols in Tianjin, North China.

The authors collected PM<sub>2.5</sub> filter samples diurnally in Tianjin and quantified organic molecular components in two seasons, winter 2016 and early summer 2017. They reported the organic compound levels and estimated the contributions from biomass burning, biogenic emissions and anthropogenic emissions, in view of primary and secondary sources. Although there are quite an amount of studies on source apportionments of PM<sub>2.5</sub> in northern China, their reports on aerosol organic compounds are relatively rare and valuable. The writing is easy to follow, while I suggest the authors to

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consider the following comments before the paper being published.

#### Major comments

1. It has been long realized that the major sources of OC in fine aerosols are combustion sources (fossil fuel combustion and biomass burning) and secondary oxidation, in comparison with coarse particles (PM<sub>10</sub> or TSP) where dusts and primary biological sources also matter. In the current study, biomass burning, anthropogenic sources (used as toluene and naphthalene SOC), and biogenic sources, as well as plant debris and fungal spore all together are contributing 25-35% of OC (Table 1, Figure 13). The readers may expect if the study could provide more information on the possible sources of the other 65-75%, i.e., the major fraction of OC.

2. It is interesting that saccharides and sugar alcohols showed higher levels in winter than summer in PM<sub>2.5</sub> (Fig. 7, Fig. 9). The results imply that sugar alcohols are co-emitted during biomass burning, or co-transport (co-exist) with biomass burning aerosols (Table S3). This observational evidence was speculated in previous studies but not justified. Discussions from such a viewpoint could be interesting to the community.

#### Minor comments

1. P2, L22, 'due to' change to 'along with'?
2. P2, L33, southerly wind mainly in summer, or throughout the year?
3. Fig. 1, westerly winds prevail mainly in winter, better to add that. It is not necessary to add the location of Mt. Tai. It is better to add an insert figure, showing sampling location in an enlarged map of Tianjin.
4. P4, L29, how is PM<sub>2.5</sub> mass measured? Such information is needed to readers. It is interesting to see co-varied PM<sub>2.5</sub> and RH. What are the possibly reasons/implications?

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5. P5, L1, high concentrations that what level, any threshold?
6. P5, L31-P6, L2, Table S2, it is not easy to understand how WNA (%) is calculated. As they account for only ~10%, What are the other 90%.
7. P8, L11, 12, unify sugar alcohols and sugar polyols throughout the text.
8. P11, L11, aerosols in Rishiri did not appear in Fu et al. 2010b.
9. P11, L26, give the full name of DHOPA as it appears for the first time.
10. P12, L6, Fig.2, wind direction data could not be seen.
11. P12, L9-13, is there any direct evidence showing burnings in southern of the site in the same period?
12. P12, L17-18, is that true that plastics will evaporate? Please add references.
13. P12, section 3.4.1, it is necessary to add methods to evaluate contributions of BB, fungal spores and plant debris, etc., to OC.
14. P13, L6, 'Table 12a-b, and 13' change to 'Figure 12a-b, and 13'.
15. P13, L6-10, fungal spore OC estimated by Zhu et al. (2016) is based on TSP samples. As these particles are quite large, they have large contributions to OC in their study. It is reasonable that fungal particles have small contributions to PM2.5 samples.
16. P13, L16-17, it is necessary to add reference for the tracer mass fraction factors.
17. P14, L7-9, it would be better to add some reference about the possible plastic emissions if any.
18. Tables S3-4 were not referred in the text?

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