

Interactive comment on “Source apportionment and dynamic changes of carbonaceous aerosols during the haze bloom–decay process in China based on radiocarbon and organic molecular tracers” by J. Liu et al.

Anonymous Referee #1

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This study presents ^{14}C level in carbonaceous aerosols, and inorganic ions and anhydrosugars in $\text{PM}_{2.5}$ during the spring period of 2013 in Beijing and Guangzhou. The study concludes that both primary and secondary matter from fossil sources played a key role in the blooming phase of the pollution episode. In my opinion, several critical issues need to be addressed in this study as detailed below.

1. The chemical components of $\text{PM}_{2.5}$ in both Guangzhou and Beijing have evidently seasonal variations. The sources of major aerosol chemical components are expected to be highly variable with seasons, and the causes for haze formation could also be

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different from season to season. For example, secondary inorganic aerosols were the dominant sources in summer while biomass burning sources were in autumn/winter in Beijing (Zhang et al., 2013; Cheng et al., 2013; Du et al., 2014). Heavy haze mostly occurred in winter instead of in spring in Beijing. Why this study picked a spring period? Will the results be applicable to other seasons? Moreover, only a few data samples are presented in this study to illustrate one aerosol pollution episode during the spring period in Guangzhou and Beijing. How is the representative of the episode case in spring for these two cities?

2. While haze is mainly caused by aerosol pollution, they are two different definitions and should not be used interchangeably. Besides PM level, relative humidity is another key factor for haze formation. This work does not provide any information on aerosol optical properties and meteorological parameters. It only presents aerosol pollution episodes in Beijing and Guangzhou, rather than haze processes. Moreover, inorganic and organic particulate matters have different mass scattering efficiencies, it is inappropriate to conclude haze is predominantly driven by organic matter and nitrate only based on mass concentrations. The focus of the study may need to be modified based on available data and analysis conducted in the study.

3. Page 34959, line 20. The OM is the biggest contributor to PM_{2.5} in Beijing and Guangzhou. However, 41~49% fraction of PM_{2.5} were unidentified. Such a large percentage of unknown mass fractions of PM_{2.5} make people wonder if the conclusions are valid. The authors are suggested to reconstruct the PM_{2.5} mass based on daily data. The OM conversion factors are 2.1 and 1.3 to WSOC and WSIC, respectively. However, these conversion factors are obtained from a rural site in Hungary from January to September 2000 (Kiss et al., 2002). These factors may not be suitable for application in the urban area of Beijing and Guangzhou.

4. Page 34959, the authors are suggested to provide direct evidences that the higher calcium concentration in Beijing is related with dust storm during the sampling period, as it could also come from road or/and construction fugitive dust.

5. Page 34964-34965. The growth of carbonaceous aerosols and nitrate also related to the combined influence of boundary layer height, humidity, chemical reaction and their thermodynamic properties. It would be better to provide more convincing evidence to show the growth is more related to the sources rather than the meteorological factors.

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