Reviewer 2

This manuscript for the first time studied the sources and evolution of aerosols and VOCs synchronously with corresponding state-of-the-art instruments in a megacity of Central China. Most uniquely, unlike other events in previous studies, as the emission control measures of 7th CISM Military World Games stressed mainly on the industrial emissions, the vehicle and cooking emission dominated the sources of organic aerosols and VOCs. Taking this opportunity, the study clearly separated the two sources and identified their emission evolution with different mechanisms in daytime and nighttime respectively under the real ambient air. It is quite valuable and of great significance. I think it is a well designed and prepared paper, and can be accepted after the following questions answered.

We thank reviewer for the comprehensive and overall positive comments on our study. We have now addressed all comments and revised our previous manuscript accordingly. Reviewer's comments are in black italics. Our reply is in red, and the corresponding changes in the texts are highlighted in yellow.

Line 71, are only industrial sources controlled? More detailed emission control information should be given.

More information is now given.

"Due to the preparation and hosting of the 7th CISM Military World Games during the experimental period, the government implemented strict emission reduction measures, particularly for the industrial sources and heavy vehicle emissions in the main roads. The more localized pollution sources, such as traffic emission from smaller sizes of vehicles and cooking sources dominated the pollution in this study,…"

Line 70-73.

Line 149, it is also due to low relative humidity as Figure 1 shown.

It has been revised.

Line 164, the corrected name of N.L. et al. should be given.

It has been revised.

Line 187, to a previous report

It has been revised.

Line 192, the RH at noontime (10-15) is still high around 60%, higher than those of northern cities. Is it possible that SOA be formed through aqueous oxidation?

The related discussions are added.

"Considering the high RH during the experiment (> 60 %, Fig. 1g), OOA2 factor may have also experienced aqueous chemistry and showed good correlation with sulfate (r = 0.82)."

Line 199-200.

Line 247, there is evidence that isoprene in Beijing can be from vehicle emission, in this study, can it be attributed to vehicle emission? For example, Gu et al., AE, Investigation on the urban ambient isoprene and its oxidation processes; Cheng et al., JES, Atmospheric

isoprene and monoterpenes in a typical urban area of Beijing…. The authors can give related discussions.

The related discussions are added.

"The daytime biogenic emission, e.g. isoprene, may also contribute to the SecVOC2 formation by interacting with OH in the presence of NO_x (Lin et al., 2013), producing methacrylic acid epoxide (MAE) and methacrolein (MACR) as intermediately involved in SOA formation (Gu et al., 2021)."

Line 237-239.

Line 299, is there evidence that NO_3. can be formed from cooking emission or is it an important formation pathway or source?

We have not directly measured NO_3·. The only estimate is the nighttime NO_x may be partially from cooking sources, but this cannot be discriminated from nighttime traffic sources.

Line 312, the scaling of CO can be also influenced by the wind speed, temperature, etc, not only boundary layer. The sentence should be corrected.

It has been revised.

"...to indicate the variation of species regardless of the boundary layer evolution, wind speed, wind direction and temperature."

Line 325-326.

Line 325-326, I suggest a quantitative law or conclusion should be given. For example, can the ranges of higher temperature be given through this study?

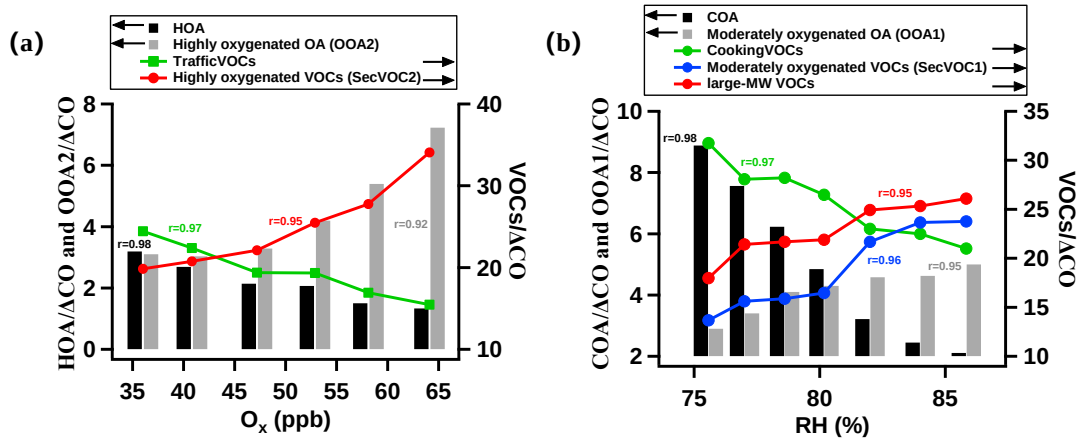
This is revised as:

"The gases evaporated from aerosol phase (especially under higher temperature when increased saturation pressure for semi-volatile or intermediate volatile species) and primary VOCs may be simultaneously involved in the photooxidation, further contributing to the SOA formation."

Line 338-340.

Figure 5b, I am not sure why 3% scale of RH was adopted for the data classification. Also from Figure 5b, I cannot find the correction coefficients.

The scale is now revised as 5%. R is now added in Fig. 5.



Line 334, how the production rate of 0.2 µg m^{-3} h^{-1} be obtained. I can not find the calculation processes.

This is now clarified:

"An approximate production rate of 0.2 µg m^{-3} h^{-1} of OOA from cooking source can be obtained by considering the ageing time of ~10 h (from COA peak 18:00 to OOA1 peak 4:00)."

Line 348-350.

References

Gu, C., Wang, S., Zhu, J., Wu, S., Duan, Y., Gao, S., and Zhou, B.: Investigation on the urban ambient isoprene and its oxidation processes, Atmos. Environ., 270, 118870, https://doi.org/10.1016/j.atmosenv.2021.118870, 2021.