Dear Prof. Wang,

We would like to thank the anonymous reviewer for the great efforts. On the basis of the reviewer's suggestions, we have updated this manuscript greatly. We greatly appreciate those comments and valuable suggestions from the reviewer. Also, we are grateful to your efficient serving for this manuscript.

Here we submit our revised manuscript **"Measurement report: VOC characteristics at the different land-use types in Shanghai: spatio-temporal variation, source apportionment, and impact on secondary formations of ozone and aerosol" (Manuscript number: acp-2022-250)**. In the attachments, a point-by-point response to each point raised from the reviewer was uploaded. The revised version marked for reviewing and the clean version for editing were supplied, respectively.

Yours sincerely,

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Comment 1: Line 14: VOCs is precursor of SOA, which is accounted for large proportion of aerosol. It is Aerosol that have great impacts on climate change. I think the expression that VOCs have important impacts on climate change in not appropriate here.

Response:

Thank you for your questions. The aromatics accounted for large proportion of aerosol (Zhang et al., 2017; Li et al., 2020). We have rewritten the description in the revised manuscript.

Page 1, line 15:

"*Volatile organic compounds (VOCs) have important impacts on air quality, atmospheric chemistry and human health.*"

Comment 2: Line 62: Should be: "similar as/in agreement with the finding of Tang et al. (2008)".

Response:

Thank you for your comments. We have rewritten the description in the revised manuscript.

Page 2, line 61:

"*Kumar et al. (2018) found that the VOC concentration at the urban area was approximately twice higher than that at the rural area in Delhi, India, in agreement with the finding of Tang et al. (2008).*"

Comment 3: Line 213: Δ_{O3} should be $\Delta_{PM2.5}$.

Response:

Thank you for your comments. We have rewritten the description in the revised manuscript.

Page 8, line 213:

"*where Δ_{VOCs} and $\Delta_{PM2.5}$ is the concentrations of VOCs and $PM_{2.5}$ in the specific $PM_{2.5}$ gradients, respectively.*"

Comment 4: Line 228: $Ln(\Delta_{PM2.5}/B_{VOCs})$ should be $Ln(\Delta PM_{2.5}./B_{PM2.5})$.

Response:

Thank you for your comments. We have rewritten the description in the revised manuscript.

Page 8, line 227:

"*where k represents the linear coefficient between* $ln(\Delta_{VOCs}/B_{VOCs})$ *and* $ln(\Delta_{PM2.5}/B_{PM2.5})$*, c is the intercept.*"

Comment 5: Line 251: The pearson correlation coefficient between VOCs and $PM_{2.5}$ at QP was low (0.25) and was much lower than the other two sites. It was not proper to make the conclusion that the elevated VOCs lead to the elevation of $PM_{2.5}$ at QP site, or VOCs and $PM_{2.5}$ at QP have similar emission sources.

Response:

Thank you for your comments. The pearson correlation coefficient between VOCs and $PM_{2.5}$ at QP was low (0.25), while the spearman correlation coefficient ($R_{Spearman}$) between the VOCs and $PM_{2.5}$ was 0.34 ($p < 0.01$) indicated that VOCs was positively correlated with $PM_{2.5}$. We have rewritten the description in the revised manuscript.

Page 9, line 260:

"*It was well documented that the elevated VOC concentrations indicated the increasing rate of* $PM_{2.5}$ *production via photochemical oxidation, gas-particle partition and/or heterogeneous absorption (Seinfeld et al., 2001; Yang et al., 2015; Han et al., 2017).*"

We deleted the description that $PM_{2.5}$ and VOCs had similar emission sources in the revised manuscript.

Comment 6: Line 571: Is the much higher contribution of industrial sources lead to the relative lower contribution of vehicle in JS? Or do you have data of automobile density to support this conclusion?

Response:

Thank you for your comments. The JS site is located in the industrial regions favouring the contribution accumulations of industrial production and coal combustion which led to the relative lower contribution of vehicle exhaust compared with the PD and QP sites. We have written the description in the revised manuscript.

Page 19, line 574:

"*It is interesting to note that the vehicle contribution was expected to be lower at the JS site than those at the PD and QP sites. This finding reflected the fact that the JS site is located in the industrial regions favouring the contribution accumulations of industrial production and coal combustion (Yoo et al., 2015).*"

Comment 7: "Under the high OFPs, ……These results……. (Yoo et al., 2015)." High OFPs is not always occurs synchronously with high O_3 episodes, since O_3 formation needs good photochemical conditions, which lead to strong photochemical removal of VOCs. These sentences were hard for me to understand, please consider rearrange the words.

Response:

Thank you for your comments. We have rewritten the description in the revised manuscript.

Page 20, line 614:

"*The higher OFPs at the JS and PD sites (50.85 ± 2.63 and 33.94 ± 1.52 ppb) relative to that at the QP site (24.26 ± 1.43 ppb) were observed. However, the concentrations of O_3 at the JS and PD sites (73.59 ± 23.59 and 57.48 ± 20.49 μg m^{-3}) were lower than that at the QP site (99.30 ± 24.00 μg m^{-3}), indicating the poor O_3 formation conditions. Specifically, the locations of JS and PD sites resulted in the high emission strength, which could release to high pollutant concentrations and lead to severe atmospheric pollution (Cai et al., 2010a, b; Zhang et al., 2018). This phenomenon could change the strength of solar radiation and further decreased the intensity of O_3 photochemical reactions (Kumar et al., 2018).*"

Comment 8: Line 644: "The four groups of VOCs…." These sentences were hard for me to understand, please consider rearrange the words.

Response:

Thank you for your comments. We have rewritten the description in the revised manuscript.

Page 21, line 645:

"*The VOC compositions displayed similar linkages with VOCs, and the higher values of k were attributed to the aromatics at the JS and PD sites, while the alkanes at the QP site (Fig. S5).*"

Lastly, we would again express our appreciation to the reviewer and editor for their warmhearted help. Thank you very much!

References

Li, Q. Q., Su, G. J., Li, C. Q., Liu, P. F., Zhao, X. X., Zhang, C. L., Sun, X., Mu, Y. J., Wu, M. G., Wang, Q. L., and Sun, B. H.: An investigation into the role of VOCs in SOA and ozone production in Beijing, China, Sci. Total Environ., 720, 137536, https://doi.org/10.1016/j.scitotenv.2020.137536, 2020.

Zhang, G., Wang, N., Jiang, X., and Zhao, Y.: Characterization of ambient volatile organic compounds (VOCs) in the area adjacent to a petroleum refinery in Jinan, China, Aerosol Air Qual. Res., 17(4), 944-950, https://doi.org/10.4209/aaqr.2016.07.0303, 2017.