

Atmos. Chem. Phys. Discuss., referee comment RC2
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Comment on acp-2022-379

Anonymous Referee #2

Referee comment on "Daily evolution of VOCs in Beijing: chemistry, emissions, transport, and policy implications" by Marios Panagi et al., Atmos. Chem. Phys. Discuss.,
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This manuscript focused on ambient VOC measurements in Beijing, and investigated the local and regional contributions, as well as photochemical effects on VOC concentrations in Beijing through modelling approaches. The study is of interest to the atmospheric community and suitable for publication in ACP. However, there are not many new insights from the analysis, and the discussion in the manuscript is not enough to give a full picture of the VOC chemistry, sources, transport, and control policies in Beijing as the authors claimed in the title. Besides, some conclusions in this study are inaccurate. Moreover, the manuscript is not well-organized, and suffers from many flaws especially the language expression. Overall, the quality of the manuscript does not reach the standard for publication in ACP in current state. A revised edition is encouraged for resubmission. Some detailed comments are provided for the authors as follows:

- How many VOC species were detected by GC-FID? Could you present detailed observation data? In the manuscript, only limited species were listed and used for comparison with modelling results. Better to use more species if there were.
- The method used to estimate OFP is irrational. The VOCs measured in the ambient are already reacted. Since the OH concentration in summer is usually higher than that in winter, the photooxidation is more reactive in summer and thus in general higher O₃ production. One should use corrected VOC concentrations to calculate OFP, otherwise will lead to wrong conclusion.
- What's the uncertainty of modelling results in this study? In Table 1, the variations in modelled VOC concentrations are small among different scenarios. It's difficult to tell they are real changes due to different settings.
- L64-67. I do not clearly understand this sentence. But according to Gu et al. (2019), the concentrations of NMVOCs in winter polluted days were highest, followed by summer polluted days, summer normal days, and winter normal days.
- From my side, It seems better to put the description of VOC/CO ratio (Sect. 3.1), the region division for NAME (in Sect. 3.2), and the scenarios description (in Sect. 3.3) to Sect. 2.
- What does APHH VOC/CO * CO APHH mean in Fig.3? In my understanding, APHH VOC/CO * CO APHH = VOC APHH.

- L223-225: "During the summer campaign, ... to the 20% that was observed in the winter." It's difficult to understand this statement.
- Fig.9: Poor correlation between NO_x and VOCs for both measured and modelled data. What's the reason? Do you have any explanations?