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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Source characteristics of volatile organic compounds during high ozone episodes in Hong Kong, Southern China" *by* J. Zhang et al.

Anonymous Referee #3

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General remarks The manuscript of Source characteristics of volatile organic compounds during high ozone episodes in Hong Kong, Southern China by Zhang et al. performed a diagnostic analysis on VOCs sources during ozone episode in Hong Kong. The method, using the ratios of VOCs as well as other gas pollutants, is a useful one when reliable source inventory is not available. I personally think the use of C6H14-to-Toluene ratio is interesting. However, as the spatial distribution of VOCs sources is not addressed in the manuscript, considering the complex of the emission sources in both Hong Kong and Pearl River Delta region, and also the roles of chemical processes and transportation, the conclusion from the preliminary diagnostic analysis seems not to be convincing enough. I will suggest more careful check is needed, before some

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very important points about VOCs sources, and also on the influence of Guangdong province to Hong Kong ozone problem, can be made.

Specific comments: 1. The introduction The current introduction section can be enhanced by adding more recent studies in Hong Kong and Pearl River Delta region on the measurements of ambient VOCs species, and VOCs sources including both inventories and source profiles. The method and its constrain to use of VOCs ratios as a tool to explore the sources can also be discussed in this section. 2. The comparison of VOCs ratios from ambient measurements with ratios derived from source inventories. The whole section of 3.3 gave the readers an impression that the sources in both PRD and Hong Kong are not fully understood. Therefore, I would like to suggest that the ratios of the VOCs species in this manuscript derived from the published source inventories and relevant references are summarized before the ambient data is discussed. One needs to know how the ambient ratios comparing to the ratios of various sources. Of course, the reasons that may cause discrepancy will have to be mentioned, as the source inventories are annual average data, while the ambient data are only taken from October to December, and the local chemistry may play a role in changing the ratios from source to receptor site etc..

3. The interpretation of the sources of industrial, waterfront, and fuel storage activities As stated in page 7 for the contribution of industrial, waterfront, and fuel storage sources, one has no idea how the ratios of C6H14-to-toluene are for these sources, so from the data present in figure 5a, it could be the excess of toluene comes from one or two of these 3 types of sources. The way to confirm which source could be more reasonable, is not explained adequately.

4. The points on the influence of Guangdong by using the ratios of and dCO/dNOy I think more careful and detailed analysis were needed if the conclusion on the influence of Guangdong could be acceptable. Actually, the whole manuscript is more qualitative rather than quantitative, but in page 8, “over 30% of the variability was corrected with a factor associated with pollution from Guangdong province” was stated,

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the approach to obtain such an analysis was not provided. And this point was repeated even more strongly in summary of this part on page 10. Actually, the anti-correlation between ratios of mp-xylene-to-ethylzenzene and ozone shown in figure 2a indicated that more likely the ozone formation at TO is a local chemical process.

5. The discussion on the ratios of p-xylene-to-total xylenes is pretty strong in the manuscript. One would like very much to know the uncertainties of the ratios for both ambient data as well as the source data. And as the ambient data were obtained probably at different time of a day, the comparison of ambient level with ratios derived from sources needs to be very careful by put the error bars on.

6. The VOCs analysis done by UC Irvine gave different species at TO from that of EPD sites, and the author gave one detection limit for all species. I suggest this part on page 3 needs to be clarified though this is not the work of the authors.

7. As indicated by the authors, the source profiles from US EPA were used directly to make the speciated source inventories for Hong Kong and PRD. I can understand the reason when localized profiles are not as good as the one from US, however, the authors need to mention the possible problems by doing so.

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