

Comment on acp-2022-302

Anonymous Referee #1

Referee comment on "Chemical evolution of secondary organic aerosol tracers during high- $PM_{2.5}$ episodes at a suburban site in Hong Kong over 4 months of continuous measurement" by Qiongqiong Wang et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-302-RC1>, 2022

This manuscript reported a four-month's continuous bihourly measurement of various types of secondary organic aerosol (SOA) tracers originated from common specific volatile organic compounds (VOCs). The authors focused on the concentration change of the SOA tracers during high $PM_{2.5}$ episodes and found obvious mass increment of the SOA tracers during the episodes especially in summer and fall, suggesting enhanced SOA formation during the episode. Moreover, the chemical formation mechanism and ageing of the biogenic SOA formation during the episodes were examined with the measurement of multiple molecular tracers from single VOC precursor, which provide valuable insight into the formation mechanism under ambient atmosphere similar to this study area. In general, this manuscript is well written, and the dataset is large. The manuscript can be accepted with the following revisions:

- As the focus of this work is to examine the SOA tracers, while most of which lack authentic standards for the quantification. The authors should elaborate more on how the identification and quantification was achieved (such as the retention time, quantification ions, etc.).
- The SOA tracers are widely used to estimate the SOC contribution either by the SOA tracer method or by receptor models such as Positive Matrix Factorization (PMF). Since the comprehensive measurement data are available, do the authors plan to conduct such analysis to get a more quantitative estimation of the SOA contribution?
- Lines 190-194: Why the authors only selected the "before-episode period" to evaluate the evolution of SOA tracers, instead of using all measured data?
- The date format in the main text and Tables is not consistent. For example, "10 Jul. -7 Oct" in Line 135 vs. "Sep-01 12:00 PM" in Table 1. Please check and unify the format.
- Figure 1: there are only two sites showing numbers near the column plot in the figure, are they the concentration values stated in the figure caption? How about the other sites?
- Figures 5-6: the figure numbers "(a)" and "(b)" in the figure are missing.
- Figure S8: The axis of Figure S8 is not readable.
- Line 193: "were" should be "are".
- Line 230: "in Chow et al. 2016)." should be "in Chow et al. (2016)).".
- Lines 297-298: The description is not consistent with the content of Figure 5. At EP6N, isoprene SOA tracer concentrations were higher in the time period before the episode.

- Lines 374-379: The description is not consistent with Figure 7.
- Line 403: "2-methyl tetrols" should be "2-methyltetrols".