The study investigates the characteristics of VOCs and their importance in ozone formation during June in Zhengzhou City, China. The study focuses on the interesting relationship of O3-NOx-VOCs during summer, which is crucial for ozone control strategies. The study compares O_3 pollution events and clean days regarding different sources and O_3 formation sensitivity. However, the manuscript is poorly written and not up to the mark for consideration for publication in ACP. The authors fail to discuss crucial sections of the manuscript.

The authors do not include basic details about the instrumentation and dataset. Why is only a small part of the VOC measurement included in the PMF analysis? The reason is not mentioned properly in the manuscript or supplementary.

More in-depth comparisons with similar previous studies in Chinese/ Zhengzhou city would enhance the wider impact of the manuscript. Details about common factors and key trace VOC species can also be included. Any new or unique source or marker emerging from the region during the study may provide valuable insights.

Discussion related to the influence of meteorology and the transport of air masses needs to be included and explained.

Some of the statements require supporting references and proper reasoning. Also, VOCs can be changed to NMVOCs throughout the manuscript.

Detailed comments:

Lines 114-115: "The sampling site is surrounded by residential areas, commercial areas, and office buildings, and there are no obvious atmospheric pollution sources nearby, which is a typical urban site."

These lines should be changed to the following for better clarity.

'The sampling site is a typical urban site, surrounded by residential areas, commercial areas, and office buildings. There are no point sources of air pollution nearby (mention up to how much radius)."

Line 99 'heaviest' should be 'highest'

Lines 116-117: “The sampling site is surrounded by roads and vegetation, and the sampling may be affected by motor vehicle emissions and plant emissions.” changed to “The sampling site may be affected by motor vehicle and plant emissions.”

Section 2.2. Sample collection and chemical analysis

More details should be provided about the instruments used for supporting measurements. Details about the input of sampling air should be added. Details about sampling dates, calibration, sampling time resolution, etc, should be added.

Section 2.3 PMF model

Only 29 out of 115 VOCs have been used for PMF analysis. Why is that? Multiple studies have used more than ~90 VOCs in the PMF model and shown its advantages. The author mentioned that species with missing samples were excluded. A very high proportion of sampling is missed out. This questions the reliability of the collected samples and dataset. More details about the error matrix and uncertainty should be included in this section. Why were the 5-factor solution, 6-factor solution, and 8-factor solution not considered? Did the author observe any source tracers or markers mixing in these solutions?

Section 2.4 Conditional bivariate probability function analysis

More details in the section are required.

Line 192 areas are non-polluting processes (clean days). Remove ‘non-polluting processes’

Line 192-193 During the observation, O_3 polluted days were 22 days, accounting for 73%. You mentioned cases 1 (8th-17th Jun.) and 2 (20th-27th Jun.) as pollution events, which is 18 days instead of 22 days. There is a discrepancy. Most of the days are included in ozone pollution events in June.

Line 198 ‘The mean concentrations’ change to ‘The daily mean concentrations’.

Lines 199-200: All were lower than the ambient air quality standard value (National or WHO). Add reference. Also, compare the values with national standards/ WHO standards for pollutant criteria.

The mean of each VOCs species (115 in number) or at least which species have been measured should be added to the supplementary in Table.

The variation of different families or groups of VOCs can be added as a time series in Figure 1. Also, the left and right y-axis are not aligned properly with the text.

Section 3.2 Sources of VOCs

Figure 4: The VOCs concentration is given in ug/m3, while it is mentioned as ppbv in the whole manuscript. Please check the discrepancy in the units.

An explanation of each factor concerning the sampling site is required. As you mentioned, there are no point sources nearby, so why is industrial pollution showing 22%? What could be the contributing factors for it?

Have you also performed PMF on clean days and polluted days simultaneously? One suggestion is to check if PMF gives different results in different cases (Case 1 and Case 2 and clean days) and compare the results.

Secondary VOCs, such as OVOCs and amines, play an important role in identifying VOCs sources. The ratio of OVOCs and other family groups should also be analysed in each source to determine their contribution. This will give great insights into the source characterisation.

More explanation is required for Figure 5.

Liness 366-369 indicate that similar sources contribute to O3 pollution events and clean days. Does it mean that the emissions of primary and secondary VOCs do not influence O_3 formation? Then, what are the reasons for O3 formation in the area?

Section 3.3.1 O_3 **sensitivity analysis**

Line 383 indicates that O_3 formation is more sensitive to biogenic emissions. Why is that? Add references to previous studies in urban settings, how AVOCs and BVOCs vary and their effect on ozone levels.

Line 382-383 What could be the possible reasons for the RIR of BVOCs being higher than AVOCs? What are the biogenic VOCs species you have included in this analysis? Add these details in the section.

Figure 6: The RIR (%) looks similar for every case. Even for clean days, aromatics show higher values than polluted events. I suggest to check the values.

Another section should be added to compare the study results with the source apportionment studies in the city in different periods or seasons. Also, comparison with other Chinese cities studies can add extra value to the analysis.

Section 4 Conclusions:

The authors have just given a summary of the results obtained. No explanation is included about why and how any trend follows the study of how sources influence O_3 formation in the area. What could be the driving factors for the presence of any particular source? You should include more details in the section.