We thank for the constructive comments and suggestions. We revised our manuscript according to the comments and suggestions. The following list the point-to-point response to the comments.

The authors of the manuscript, "Surprisingly high levels and activity contribution of oxygenated volatile organic compounds on the southeast of the Tibetan Plateau", present observed characteristics of VOCs composition in a Tibet field campaign at Lulang, and investigate the sources of different VOC species using PMF and PAP approach. It is an interesting project, the outcome of which will definitely strengthen the understanding of atmospheric composition, especially in terms of OVOCs, in Tibetan Plateau. I appreciate the efforts the authors have made in conducting the in-situ measurements, analyzing the observational data, and performed the source apportionment. However, there are key questions need to be addressed before the manuscript become a qualified scientific article of Atmospheric Chemistry and Physics.

General comments:

1. The current Introduction provides very limited information on the innovation of the authors' study. While VOCs are important air pollutants affecting atmospheric chemistry and human health, the authors are expected to provide more specific information on what makes their study a unique one, instead of spending most words in general introductions which are commonly knew. As the authors listed, there have been a few studies investigating OVOCs at different sites over the TP. What are the differences between their study and the previous ones? What innovative findings can they provide to advance the understanding of OVOCs at TP? Unfortunately, the audience cannot tell according to the authors' descriptions. The VOC observations are so hard-won, and hopefully they can be well presented.

Response: we revise the Introduction section to provide more specific information on the novelty of our approach, the differences between our study and previous ones, and the innovative findings we aim to contribute.

2. As the authors have mentioned, the PMF model includes a hypothesis that the composition profile of the studied air pollutants does not change in the air. As OVOCs are highly active, the PMF model may not be a quit suitable approach for source attribution of OVOCs. The authors suggest that they have introduced the initial mixing ratio to address this problem for a certain VOC species. Have this correction been applied to the concentrations of all the species included in the source apportionment? To what extent this mismatching problem can be fixed? The description is not clear so the related results presented by the authors are questionable from the perspective of audience. Even though the authors have obtained similar source attribution results from PMF and PAP methods, I still suggest them to consider whether the PMF part of discussion should be included in the manuscript if they cannot address the problem correctly.

Response: We agree that the PMF model has inherent limitations in accounting for the chemical losses of VOCs during transport, which can introduce errors into the source apportionment results.

To address this concern, scientists have introduced the concept of the initial mixing ratio, using either the photochemical age method or the isoprene oxidation method, which can help mitigate this weakness to some extent. However, the initial mixing ratio is not directly measured but is calculated. These calculations rely on several assumptions, including that all major VOC species are emitted from the same source, that other emission sources are negligible during transport, and that chemical losses of VOCs are primarily due to reactions with OH radicals, while reactions with NO_3 radicals and other factors are ignored. These assumptions may not fully align with real-world conditions, introducing uncertainties into the calculated initial mixing ratios.

In our study, we did not apply the initial mixing ratio directly in the PMF model. Instead, we incorporated this approach into the PAP methods specifically designed for OVOC source apportionment. The similar results obtained from both the PMF and PAP methods suggest that, despite their differences, these approaches provide comparable insights into the sources of VOCs in the studied region. Importantly, the consistent findings from both methods indicate that the major VOC sources in the area are relatively stable.

We will add the discussion on above questions in the revised manuscript.

3. As for the PAP method, the authors use another assumption that the OVOC emission is proportional to that of an inert tracer. There are observational evidence suggesting the correlation between the emissions of secondary organic VOCs with these inert traces (e.g., CO and benzene) from traditional sector (e.g., transportation) and volatile chemical products (e.g., pesticides, coatings, inks, cleaning agents). Do these emissions are important sources of VOCs over the region of the authors' interest? Is there any observational evidence proving the rationality of this hypothesis in estimating OVOC emissions from other sectors? All the related queries should be addressed, otherwise the source attribution results cannot be logically convinced unfortunately.

Response: We have just applied the PAP method as it has been previously developed and utilized by many other studies. We agree that there is a need for consideration of the emission sources and their relationship to inert tracers in our region of interest. Currently, we do not have real ratios between anthropogenic VOC emissions and CO in our study area. As such, we have relied on the established approach within the PAP method. In the PAP method, emissions are represented using broad categories such as primary anthropogenic emissions, anthropogenic secondary formation, natural sources, and background, without specifying specific sources. We agree that the uncertainties associated with this approach should be further discussed in our analysis, and we will include uncertainty analysis in our revised manuscript. In addition, we will add related background introduction and judgement to illustrate that the results of source apportionment are consistent with our cognition of the local environment in the revised manuscript.

4. Given the shortcomings of the approaches that the authors have used in tracking the sources of VOCs, discussions on the uncertainty of their results should be necessary to show the audience the significance and representative of this study.
Response: We will intensify the discussion of uncertainty.

Specific comments:

L33: It would be better to use 'both' than 'whether' in this sentence.
Response: accepted.

L34: 'Activity' is a countable noun, so it would be good to use plural here.
Response: accepted.

L54: Transport from south Asia is not 'transcontinental' transport.
Response: corrected.

L68-79: There are geographical information on so many different sites there. It would be good to show a map figure so that the audience can tell the relative location of these names more directly.
Response: we will add information directly in Figure S1.

L77: Please add "LST" after the two time periods
Response: accepted.

L84: It would be good to include the name of each VOC species in Supporting Information so that the audience can get what VOC species are included in each group in this study.
Response: accepted. We added a list in the Supplementary materials.

L95: It would be good to introduce the approach briefly in the manuscript even though it has been used in other related works before.
Response: The PMF method is extensively employed in VOCs research and its description can be easily found elsewhere; therefore, in the interest of brevity, I believe it can be omitted from this text. Besides, the referenced literature is openly accessible.

L106-107: Please cite the related references here.
Response: Accepted.

L128: Please explain how the emissions of OVOC and benzene can be obtained.
See response 3.

L152: It seems that the Lulang site is not an urban site according to the descriptions in Introduction section, but the observed CO and NOx still show distinct urban diurnal variations. The results are kind of confusing.
Response: Despite not being a city station, the Lulang site is still subject to human activity, such as biomass burning and traffic emission for specific time periods.

L156: It is hard to tell the diurnal variations of each VOC species in Figure1b, since it shows the accumulated concentrations. The authors may consider to use a more direct way to

present this.

Response: In the Supplementary materials, Fig. S2 is another way to present the diurnal variations of different VOC species.

L174-196: I appreciate the efforts that the authors have made to compare their observations with literature studies. The results should be interesting. However, more innovative analysis should be conducted to make the manuscript more than an observational report. Unfortunately, the descriptions here are just another way to present Table S1. Questions (e.g., what cause the observed differences between this study and previous ones? Why the authors' measurements matter a lot in VOC observational studies?) that the audience may be interested in are not mentioned at all.

Response: Thanks for your suggestion. We will revise these sentences in the revised paper.

L211: The authors suggest there is a surprisingly high levels of OVOCs observed at Lulang, however, the observed concentrations seem not that 'surprising' compared to literature studies in Figure 3. The authors would make more efforts in presenting why they think their findings are surprising. Otherwise, they may want to revise the misleading tile of the manuscript.

Response: Upon further consideration, we agree that the concentrations themselves may not be exceptional when compared to those reported in other literature studies, as shown in Figure 3. However, our intention was to emphasize the unexpected significance of OVOCs as a contributor to the overall VOC levels and their associated activities on the southeast of the Tibetan Plateau. In light of this, we have revised the title to remove the word "Surprisingly," and it now reads: "High Levels and Activity Contributions of Oxygenated Volatile Organic Compounds on the Southeast of the Tibetan Plateau."

L271: Are there many emissions from solvent sources in Lulang?

In Tibet, people usually live along rivers due to the mountainous terrain. There is a small village near the observation point, so there will be solvent use or volatilization. However, as a result of source analysis, this is only a small fraction of the VOC.

Response: In Tibet, people usually live along rivers due to the mountainous terrain. There is a small village near the observation point, so there will be solvent usage or volatilization. However, as a result of source analysis, this is only a small fraction of the VOC.

L296: Please explain how the mountain-valley can affect the VOC concentrations at Lulang.

Response: When sunrise, the wind speed is up (Figure S2C), it transports the aged air to the station.