We appreciate Prof. Xu for his constructive comments and suggestions. The manuscript has been revised accordingly. Our point-by-point responses to the comments are presented below. The comments are in black and responses in blue. The alterations in our paper are shown in bold text.

Thank you for submitting your revised manuscript and author final responses. You have addressed the issues raised by the referees. However, the manuscript can be further improved by additional revisions. I have a number of comments for your consideration in the revision.

1) Throughout the manuscript phrases like "polluted air mass", "air pollution episodes", "air pollution transport", etc. are used. However, the Nam CO site and the vast TP are in fact a very clean in terms of aerosol pollution, as shown by your measurements (PM1 averaged 2 ug/m3). I understand that you are differentiating air masses slightly influenced by pollution transport from those representing background. Nevertheless, I suggest choosing suitable words and expressions to avoid misunderstanding.

Agree. We have changed these phrases to aerosol plume or relative higher aerosol episodes in the updated manuscript.

2) Line 66: change "Westliers" to "westerlies".

Done.

3) Lines 87-89: "The ambient conditions at high elevation regions are characterized by higher solar radiation and concentrations of oxidants such as OH radicals and O3, which makes photochemical processing in this high elevation remote region intense and likely dominant." Are there any references? Particularly for OH that has been much less observed at high-elevation sites. "OH radicals" should be changed to "OH" or "OH radical".

Agree. We did not find the reference for OH measurement at the TP. We get this conclusion based on the photochemistry from snow/glacier studies at Polar Regions (Domine and Shepson, 2002). For a more rigorous description, we remove the content of OH radical.

4) Line 123: "county" is a concept of administrative district, but I think here you are meaning a residence location. If so, a better word is "village" or "town". You can also give a population number as additional information.

Revised as the reviewer suggested and now the sentence read.

“The Nam Co station and its surrounding is a pristine region except for a small village for local people that is about 10 km west to the station with a population of 300 to 500.”

5) Lines 124-125: "A freeway for tourists was built about 5 km south of the station." It is better to give estimated traffic intensity as this may be highly relevant to your measurements.

We add a sentence to describe the traffic intensity as follows.

"A highway for tourists was built about 3 km south of the station with a low traffic intensity (less than 300 cars per day) during June."

6) Lines 137-144: these two sentences need to be reworded. It is not clear if all the instruments named here were taking samples from the single inlet. Nor the total flowrate (16L/min or 10L/min?). An inlet cannot be maintained by a vacuum pump, but the air flow through the inlet can. What is the common abbreviation for high-resolution time-of-flight aerosol mass spectrometer? HR-AMS or HR-ToF-AMS?

We reword these sentences to make them more clarity. The total flow rate maintained by the vacuum pump and instruments was ~16 L/min. The abbreviations of HR-AMS or HR-ToF-AMS for high-resolution time-of-flight aerosol mass spectrometer are all acceptable in AMS community.

7) Although a number of instruments were deployed at the site, only small part of the data (PM1 components and BC) are presented and discussed in this paper. I suggest deleting or simplifying the description of instruments, from which no measurements are used in the current paper.

We remove the operation part for other instruments which are not used in the manuscript.

8) Line 168: "calibrated" using what?

The instrument was calibrated using a flow meter (Gilibrator, Gilian Instrument Corp., Wayne, NJ, USA), but this part is removed now based on the comment 7.

9) Line 210: change "India monsoon" to "South Asian monsoon".

Done.

10) Lines 257-259: "The slope was ~0.75 during P2 (Figure S5a), which suggested that there was excess ammonium to neutralize sulfate and nitrate." The slope 0.75 suggests that all sulfate and nitrate were neutralized by ammonium and there was additional ammonium, which indicates the presence of acids other than sulfuric and nitric acids in aerosol. I would suggest changing this sentence to "The slope was ~0.75 during P2 (green circles, Figure S5a), which suggests that there was more ammonium than needed to neutralize sulfate and nitrate."

Revised as the reviewer suggested.

11) Line 274: "plateau monsoon" is a less used concept. If it is really important in the context of your nighttime-daytime differences, a little detailed explanation is needed to show how the plateau monsoon caused the observed phenomena. In addition, the Nam Co site is very close to the Nyainqentanglha Mountains, which may cause mountain-valley (plain) breeze. Did this play a role in your measurements?

We use the concept of plateau monsoon to explain large scale atmospheric circulation over the TP which the air mass is dominated by lower-layer air convergence during warm season. This convergence could enhance the transport of air mass from outside of the Tibet Plateau. For more clarify, we add a few sentence to explain this concept.

"This phenomenon could be related to the plateau monsoon during summer, which the strong heating at the surface resulted in a shallow cyclonic circulation and converge center."

12) Lines 313-314: "The decreased mass concentration of BC indicated no primary aerosol transportation, ..." needs revision. BC is primary aerosol but primary aerosol contains not only BC. Moreover, decreased mass concentration of BC does not mean the absence of BC.

We remove this sentence and add a sentence to summary this paragraph as follows.

"These results further suggest the different chemical evolution and sources for different aerosol episodes at Nam Co Station."

13) Lines 324-328: Some of the paired averages are very close to each other. You need to take significance tests to show whether or not they are statistically significant different.

We did chi-square test for these comparisons which were all significant different. In the paper, we showed the mass fraction of different ionic category during different periods which were very close; however, their mass concentrations were distinct different as shown in Figure 11.

14) Line 335: change "could relate with" to "could be related with".

Done.

15) Line 349-350: "Thus the enhanced aerosol concentrations during afternoon could be possibly attributed to the mixed downward of aerosol layer at 16 – 18 km altitude during the growth of TP boundary layer. This type of transportation could not be captured by re-analysis of data used in the back-trajectory analysis likely due to the low time and spatial resolution." I think these are too speculative! I do not exclude the possibility that air from 16-18 km altitudes is mixed downward to the site (~4.7 km) in some particular events. However, you are discussing average conditions. Some small-scale activities may not be visible in the reanalysis data but a greater than 10 km of vertical motion of air mass may horizontally extend over meso-scale. Even if you cannot test your hypothesis using the reanalysis data, the ozone and RH measurements available from your site may be used to investigate the impact of air mass from the upper troposphere and low stratosphere, and the WRF model should be a suitable tool as well for this purpose.

Thank you very much for your suggestion. We use the WRF model to test this hypothesis and show a mixing down of air mass during P2 period at Nam Co Station (Figure. S7). In addition, we cite the paper which discussed this phenomenon in detail using re-analysis data and model (Xu et al., 2017). The sentences now read.

“Recently, Xu et al. (2017) elucidate this mechanism at Nam Co Station to explain the source of O_3 and peroxyacetyl (PAN), and found strong downward motion core events during pre-monsoon and monsoon periods which accompanied with increased O_3 and PAN at the ground level. We also performed a test using the Weather Research and Forecasting model (WRF) model to check this kind of transport during P2 which indeed showed a downward motion core at the Nam Co Station (Figure S7). Nevertheless, this hypothesis needs further validation in the future in this region.”

16) Lines 359-362: I would change this sentence to "C4H9+ was a minor peak in the OA spectra (0.6% of the total signal) and its organic-equivalent concentration averaged only 0.008 μg m-3 during this study, suggesting a minimal contribution from traffic-related primary OA". Figure 5 does not show any data of C4H9+.

Revised as the reviewer suggested.

17) Line 383: remove "totally". They are not totally different particularly in the data for P2 and Mon (Figure 6).

Agree and revised as the reviewer suggested.

18) Line 384: I do not think you have robust evidence for South Asia origin of MO-OOA. You may be able to test your statement by comparing trajectories associated with high MO-OOA with those associated with high LO-OOA.

The contribution of MO-OOA was higher during pre-monsoon especially during P2 (76%), while LO-OOA was dominated during monsoon period (67%). As shown in Figure 3, the air mass trajectories during P1 and P2 were partly from southwest (30% - 40%) with longer distance, while it was dominated from south (~ 90%) with shorter distance. For more clarify, we revise this sentence as follows.

“Based on trajectory analysis (Figure 3), MO-OOA was likely closely related to long-range transport of air mass from southwest, while LO-OOA could from relative shorter distance transport such as marine air mass from south and regional background aerosol during the nighttime.”

19) Lines 421-422: "During 8-11 June, there was a weak ridge system over the north. Intensified wind from north was observed as illustrated by HYSPLIT results (Figure 5b) ... " this is contradictory to "The possible reason was that the weak trough during P2 intensified the wind from west other than south where a lot of biomass burning emission sources locate (Figure 5b). " (Lines 426-428). The period 8-11 June was a part of P2. What was the synoptic system? Weak ridge or weak through? And which wind direction prevailed? North or west? Figure S9 shows that the wind was weak westerly and weak southerly during 8-11 June. Figure 5b is a wrong reference in both sentences. No HYSPLIT results and biomass burning data are shown in Figure 5.

These sentences have been reworded as follows.

"During 8-11 June, there was a weak ridge system over the north. Weak wind from west and south was observed and the simulated concentrations of reactive aromatics were sharply decreased (Figure S9). After that, a weak low-pressure trough system was observed again. The increased concentrations of reactive aromatics were also observed accompanying with intensified southern wind. Although these trends are basically consistent with our AMS results, there were also significant differences (Figure S9). The possible reason was that the weak ridge during P2 enhanced the wind from north and weakened the wind from west and south where a lot of biomass burning emission sources located (Figure 3b)."

20) Line 428: "low-cut" should be "cut-off low" and the cut-off lows occur in the troposphere. Zhang et al. (2017) show geopotential height fields at 300 hPa, which is in the upper troposphere.

Done.

21) Line 442: "our findings have implications for aerosol deposition ..." or "our measurements can be used for estimating aerosol deposition ...".

Done.

22) Line 732: change "mountain sites" to "high elevation sites". Nam Co is not a mountain site.
Done.

23) Figure 2: X-axis label is cut. Many figures look too busy.

The X-axis labels for Figure 2a – e are all the same, so we omit the labels for Figure 2a – d. This figure is a comb plot for this study which is easy for reading and obtaining general information of this study. We try to simplify this figure, but it is difficult. So we would like to keep it.

24) Figure 3: No details about trajectories. How many days? Ending height? Which reanalysis dataset was used? Url for fire spot data should be given.

The caption is reworded as follows.

"Figure 3. 72-hour backward air mass trajectory and class statistics over NOCS for (a) P1, (b) P2, and (c) monsoon period. The back trajectories at 1000 m above ground level were calculated at 1h intervals using the NOAA Hybrid Single Particle Lagrangian Integrated Trajectory (HYSPLIT) model (Draxler and Hess, 1998) and one degree resolution Global Data Assimilation System (GDAS) dataset (https://ready.arl.noaa.gov/gdas1.php). The classes of trajectories are colored by pressure. Fire spot observed by MODIS (https://firms.modaps.eosdis.nasa.gov) and average wind rose plot during each period are also shown."

25) Figure 4: Chaotic use of colors and symbols.

The figure is improved as the reviewer suggested.

26) Figure 7: Partly cut y-axis labels. Incomplete second y-axis label (c).

The figure is improved as the reviewer suggested.

27) Figure 9: Poor color/symbol contrast.

The figure is improved as the reviewer suggested.

28) Figure 10: Too busy and lack of descriptions in figure caption.

We have tried to improve the figure and the descriptions in figure caption are reworded as follows.

"Figure 10. PMF results of (a) high resolution mass spectra colored by six ion categories for LO- and MO-OOA, respectively, (b) temporal variations of the OA factors and corresponding comparison with tracer species (sulfate and nitrate), and (c) diurnal variations of the mass concentration of the OA factors and tracer species."

29) Figure 12: Poor color contrast for MO- and LO-OOA. What are the dashed lines in (c)?

The colors for MO- and LO-OOA are used consistently in the manuscript which are also default colors in AMS community. For more clarity, we enlarge the symbols of these two OOA factors. The details of lines in the figure are added in the caption as follows.

"Figure 12. Scatter plots of (a) *f*44 vs. *f*43, (b) *f*CO_2^+ vs. *f*$C_2H_3O^+$, and (c) H/C vs. O/C for the OA. The dash lines in (a) and (b) refer to a triangular region that encompasses ambient OOA factors determined from PMF analyses of 43 AMS datasets ((Ng et al., 2010). The light solid lines with slopes of 0, –1, and –2 in (c) indicate the changes of H/C against O/C due to adding specific functional groups to an aliphatic carbon (Heald et al., 2010); The light dash lines indicate the oxidation state (OS) of –2, –1, 0, 1, and 2, respectively (Kroll et al., 2011); The red and blue dash lines are derived from the right and left lines in the triangle plot; The heavy solid line indicate the slope of our measured data. The corresponding values of the OOAs identified in this study are also shown in each plot."

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