This study provided deep insights into the in-cloud processing nitrate formation. Nitrate is becoming a dominated fraction in fine particle in China. Investigating the nitrate formation is important to understand haze formation. It can be published in ACP after considering the following issues:

We would like to thank the reviewer for his/her positive comments. We greatly appreciate the constructive suggestions, which are really critical to improve our manuscript. We have addressed the reviewer's concerns in the sections below and made the appropriate revisions to the manuscript, with reviewer's comments are in black text followed by our response in blue text. We believe that the manuscript has been substantially improved with the consideration of these comments.

The discussion about the chemistry processes in the sampling site should be strengthened: Why the ozone concentrations were kept a relatively high level, even during nighttime? In 2018, the ozone concentrations were above 80 ppb during the entire field campaign, and, above 100 ppb for 2020. An explanation is needed for such high ozone concentration in the sampling site, especially cloudy condition.

Thanks for your comment. It is first noted that we got the unit wrong when plotting the ozone concentration, and it has been revised in the new version. We also noticed the unusual temporal pattern for ozone, without the commonly observed diurnal variations with daytime peak. In addition, the ozone concentrations kept at a relatively high level during the observation periods. Given the low NOx levels (< 10 μg m^{-3}), this is likely due to regional transport rather than local formation. This phenomenon is also indicated by an observation conducted in 2016, where O_3 episodes were associated with high levels of toluene, ethylbenzene, and xylenes transported from industrial regions (Lv et al., 2019). To make it clear, such information has been included in the caption of Fig. S1.

Lv, S., Gong, D., Ding, Y., Lin, Y., Wang, H., Ding, H., Wu, G., He, C., Zhou, L., Liu, S., Ristovski, Z., Chen, D., Shao, M., Zhang, Y., and Wang, B.: Elevated levels of glyoxal and methylglyoxal at a remote mountain site in southern China: Prompt in-situ formation combined with strong regional transport, Sci. Total. Environ., 672, 869-882, doi:https://doi.org/10.1016/j.scitotenv.2019.04.020, 2019.

Additionally, "substantial attenuation of the incident solar radiation by clouds" may suppress the ozone formation, thereby, affect the N_2O_5 formation. The N_2O_5 uptake is a major contributor to in-cloud formed nitrate, more explanations of N_2O_5 sources are also needed.

We agree with the comment. Even though the ozone formation might be suppressed by the attenuation of the incident solar radiation, the influence of such process in the formation of N_2O_5 is still limited. We have examined the variations of O_3 throughout cloud events, as shown in Fig. S1. It can be seen that the concentration of O_3 did not show substantial decrease throughout a cloud event. Together with the similar [NOx][O_3] observed during the cloud events and cloud-free periods (Fig. S5), we indicate that cloud event did not have much effect on the variation of O_3 during our observation. This is also consistent with the above response that the O_3 at this site is mainly contributed by the regional transport. Such discussion has also been included in the text, as "One may expect that the substantial attenuation of the incident solar radiation by clouds may inhibit the formation of O_3, thereby affecting the formation of N_2O_5. However, the concentration of O_3 showed relatively stable and limited variations throughout the cloud events (Fig. S1). Together with the similar [NOx][O_3] observed during the cloud events and cloud-free periods (Fig. S5), we indicate that the cloud events did not have much effect on the variation of O_3 during our observation.". Please refer to Lines 352-357 of the revised manuscript.