Dear ACP editor:

After reading the comments from you and the reviewers, we have carefully revised our manuscript. Our responses to the comments are itemized below.

Anything for our paper, please feel free to contact Prof. Gehui Wang via ghwang@geo.ecnu.edu.cn.

All the best

Can Wu

On behalf of Prof. Gehui Wang

September 30, 2022

Reviewer(s)' Comments to Author:

Reviewer 2

Comments:

The manuscript of "Different physicochemical behaviors of nitrate and ammonium during transport: a case study on Mt. Hua, China" by Wu. et al. reported the concentration of PM2.5 and composition of secondary inorganic aerosols at different altitudes. The authors investigated the physicochemical behaviors of nitrate and ammonium during the transport process. While the methods are reasonable and the conclusion convinced, there are several questions need to be clarified before publication, especially, more detail descriptions were needed.

Reply: We thank the reviewer's comments. We have carefully revised our manuscript according to the comments. See details below.

Comments:

Lines 39 and 65: Please change "mountain food" to "mountain foot"

Reply: Sorry for our carelessness. We have corrected it and carefully checked the revised manuscript.

Comments:

Line 138: The "x" in "NOx" should be italic and subscript. Please unify the expression in the text.

Reply: Suggestion taken. We have unified the expression of NO*x* as reviewer's advice in the revise manuscript. See line 140, 177, 487, 511and 569.

Comments:

Line 199: "As revealed in previous studies, …". Please add references here.

Reply: Suggestion taken. The reference has been added in the revised manuscript. See page 9, line 205.

Comments:

Line 314: "As summarized in Table 1, the water-soluble ion level …". Please indicate which site is describing

Reply: Suggestion taken. We have gave more description, see page 15, line 338.

Comments:

Lin 318-320: "Notably, this elevated contribution of WSIs was mostly attributed to secondary inorganic ions (sulfate, nitrate and ammonium, (SNA))". Note that the nitrate contribution is reduced (Figure 5).

Reply: Sorry for our inaccurate expression. We have changed as "Notably, this elevated contribution of WSIs was mostly attributed to sulfate and ammonium". See page 16, line 342-343.

Comments:

Line 332-334: "Furthermore, distinct nitrate size distributions were also observed between the different sites in the summertime of 2020." Please add references here. And if the data is unpublished, please indicate here.

Reply: The data was shown in the Figure S5, and we have indicated in the revised manuscript. See page 17, line 371.

Comments:

Line 337: In addition to R2, please give p-values.

Reply: Suggestion taken. See page 17, line 375.

Comments:

Line 351: As Figure S3 shows, the diurnal total SNA pattern at the MS site exhibited a daily maximum value instead of MF..

Reply: Sorry for our carelessness. We have corrected it in the revised manuscript.

Comments:

Line 355: "…, though these peaks lagged behind those observed at the MS site by 4 hours, further substantiating the vertical transport of these pollutants." The description here is wrong.

Reply: Suggestion taken. We have changed the inaccurate expression, and added more explains for peak lag at MS site. See page 18, line 394-395.

Comments:

Line 393: "As can be inferred from earlier studies……" Please add references here.
"Based on trace gas observations, the f_{NO2} values of the air aloft were very high due to…". Please describe the data quantitatively and indicate the source of the data.

Reply: Suggestion taken. We have added the reference in the revised manuscript. See page 20, line 436-437. As description in section 2.1, the data of NO*x* at MS site was detected by a NO*x* analyzer (Thermo, Model 42i, USA), and the NO level usually below the detection limit of the detector (< 0.05 ppb), leading to >85% of the samples being undetectable. Whereas, the average NO_2 concentration at MS site was 4.3 ± 6.3 μg/m^3, indicating a relatively high f_{NO2} value

Comments:

Figure 5: Remaining contributes 31-41.1% of $PM_{2.5}$, but specific species are not indicated.
Figure 5(b) : Remaining is not clear in the picture.

Reply: The remainder was undetected components in this study.

Comments:

Figure S1 (b): The right axis title should be "O3 at MF site".

Reply: Suggestion taken. We have corrected it.