

Interactive comment on “Observation of nitrate dominant PM_{2.5} and particle pH elevation in urban Beijing during the winter of 2017” by Yunying Xie et al.

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We are grateful to the referee and made modification according to his/her comments. Listed below are the point-by-point replies to the comments. please see the revised version of the manuscript.

Best regards,

General comments: Comments: General this paper investigates the pH of nitrate-dominated PM_{2.5}. in Beijing in the winter of 2017. The acidity of particles is important in the discussion whether or not a S(IV) might be oxidized through NO₂. The English

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language of all the manuscript must be thoroughly checked and revised where needed. As the language correction alone is massive, I think the revision of the manuscript corresponds to 'major revision'. Other than this, the manuscript is a solid work with interesting and valuable information and good analysis which should not be missed when Beijing wintertime sulphate formation is discussed. Response: We thank the referee for his/her kind reply. We have thoroughly checked and revised language. We hope that the current format of the manuscript is good enough in the aspect of language.

Detailed comments Comments: Title: Maybe better 'nitrate-dominated' instead of 'nitrate dominant'? Response: Suggestion taken. Please see the title on page 1.

Comments: Abstract, line 18: Better use 'Compared to historical records...' - see above comment, the English language of all of the manuscript has to be thoroughly checked, preferable by a professional editor or a native speaker. Response: Suggestion taken. We have asked a professional editor to help us revise the language problem. We modified it with "Compare with . . .", please see page 1, line 18-19. Comments Introduction: Needs to be fully language-edited. I cannot do this in my review. Note especially singular/plural use is wrong very often Response: Suggestion taken, as mentioned above, we have asked a professional editor to help us revise the language problem. We have corrected most of the singular/plural misusing in the text For example, page 2, line 42.

Comments: line 55ff: Maybe the role of non-classical H₂O₂ formation possibly contributing to S(VI) formation should be mentioned here. Response: Yes, suggestion taken. Non-classical H₂O₂ formation pathways are important in various conditions, especially in the haze episodes of China. We have added some related introduction into the text. Please see page 3, line 50-61.

Comments: line 183ff: How much of the observed pattern is due to weather conditions? Is there a possibility to 'de-weather' these observations? Response: The referee gave us a very good future direction. The pollution -weather feedback might be more complicated than the chemistry itself only. However, we believe this topic is beyond the scope

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of this paper. We would have further investigation on the 'de-weather' pattern's link to physiochemical properties of particles in next studies.

Comments: Figures 5 & 6: All together, this is the most interesting finding of the MS. As the nitrate/sulphate ratio increases, pH is expected to increase. Response: Thanks for the comment, and we have modified the discussion on the cause of it, please refer to page 12-13, line 270-288.

Comments: line 242: Give the correlation coefficient of the straight line plotted in Figure 6 line 308: Please do not start a paragraph like this. Response: We apologize for the inconvenience by the poor language, and revised the language accordingly. The correlation coefficient was added on the figure.

Comments: Figure 2: Maybe use identical y-axis scaling for (a), (b) and (c) ? Response: It should be a good idea to use identical axis in data comparison. However, if we use identical y-axis, then the trend might not be significant since the magnitude is quite different among the three situations.

Please also note the supplement to this comment:

<https://www.atmos-chem-phys-discuss.net/acp-2019-541/acp-2019-541-AC2-supplement.pdf>

Interactive comment on *Atmos. Chem. Phys. Discuss.*, <https://doi.org/10.5194/acp-2019-541>, 2019.