

Dear Prof. Frank Keutsch,

We are grateful for the technical corrections. We have prepared a point-by-point response to the detailed corrections, and they have been changed accordingly.

Comments to the Author:

Dear authors,

thank you for your detailed responses to the reviewers' comments and revisions of the manuscript. I just have a few additional technical corrections:

P. 4 line 72 "and this may cause bias in the particle matrix" could you make a little clearer what you mean with "bias in the particle matrix". Do you mean matrix effects can bias relative intensities? Please specify.

Yes, and we have changed it to “ ”

“...this may cause bias in the matrix of ionic intensities of chemical species.”

P. 4 line 79 "Particles are with more secondary species with deeper processing."

. Consider changing to "Particles with higher amounts of secondary species have been processed more extensively" Also, does it matter what secondary species. I am not sure that more sulfate indicates more aging/processing.

We have changed the part.

Sulfate is a typical secondary species in China (Tao et al., 2017) . Uptake of secondary sulfate from the oxidation of SO₂ via multiple pathways has caused severe haze in China. The relationship between aging and sulfate uptake has also been discussed in the literature (Li et al., 2011).

P. 4 line 80 "However, these studies lack the use of this data to provide a view of the dynamic particulate processing." Please be more specific on "these studies" and "this data".

we have fixed the part:

However, the previous studies mentioned above lack the use of data of relative intensities of secondary species to provide a view of the dynamic particulate processing.

P. 4 line 82 "the process of single particles" Do you mean the "processing" if not I don't understand what "the process of single particles"p. means.

Yes, it is processing, we have fixed the misuse.

P. 26 line 381 "Also, the emission of OC_PG and ECOC_PG is popular in the region." Popular implies that people like doing this. I would suggest using "common" or "frequent" instead.

We have changed it to "common."

P. 29 line 435 "a low concentration area of SO₂". I suggest rephrasing as "an area of low SO₂ concentration ..."

We have fixed it.

P. 29 lines 445-446 "Conclusively, the particulate characterization in rural areas around Beijing is significantly influenced by residential coal burning." I would suggest using "composition" rather than "characterization". I think "characterization" is the act of analyzing it and I think you mean that it is the actual "composition" or something similar that is influenced.

Thank you very much. We have changed it to "composition."

Please do not hesitate to contact me if you have any questions.

Best Regards,

Frank Keutsch

References

Li, W., Zhou, S., Wang, X., Xu, Z., Yuan, C., Yu, Y., Zhang, Q., and Wang, W.: Integrated evaluation of aerosols from regional brown hazes over northern China in winter:

Concentrations, sources, transformation, and mixing states, *J. Geophys. Res.*, 116, 10.1029/2010jd015099, 2011.

Tao, J., Zhang, L., Cao, J., and Zhang, R.: A review of current knowledge concerning PM2.5 chemical composition, aerosol optical properties and their relationships across China, *Atmos. Chem. Phys.*, 17, 9485-9518, 10.5194/acp-17-9485-2017, 2017.