

Responses to Anonymous Referee #1

General comments:

This manuscript investigated the aerosol hygroscopic properties for relatively large particles with a diameter larger than 300nm. As previous studies focus on fine particles, this work presented the significant hygroscopic variation of large particles. This unique measurement can enhance our understanding of aerosol hygroscopic properties. Therefore, I recommend the manuscript for publication in *Atmos. Chem. Phys.*, after properly addressing following technical but important problems.

General response: Thank you for your thorough and detail review of our manuscript. Your comments are very helpful in improving this work. Here we respond to your comments one by one. Your comments are in italics, and my responses are in plain text.

Specific Comments:

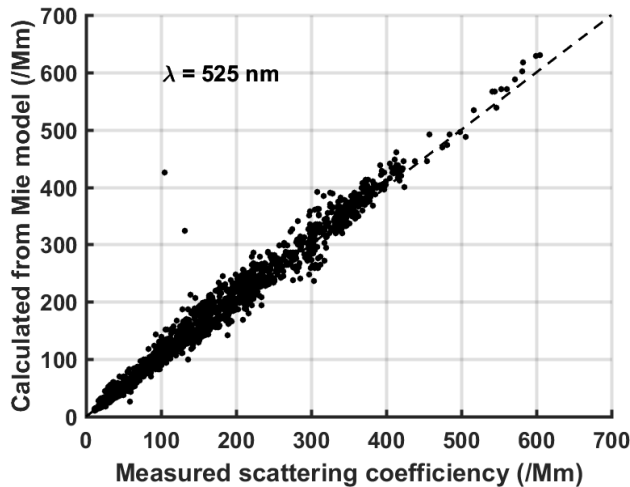
- 1. Line 14: Please define the GF.*
Response: The definition of GF was added in the text.
- 2. Line 28-29: Please check the citation format again.*
Response: The citation and reference was updated to be consistent with ACP format.
- 3. Line 48: The citation is wrong, should be (Swietlicki et al. 2008).*
Response: Thank you for your comment. The correction was made in the new manuscript.
- 4. Section 2.1: I did not understand why the authors introduced the AERONET station here, since it has not been used in this study.*
Response: Thank you for your suggestion. The description concerning the AERONET station was deleted in the new manuscript.
- 5. Line 131: The GF should be defined before.*
Response: It was defined in the abstract.
- 6. Line 142: Why the third-moment mean values? Please specify.*
Response: The third-moment mean value is the volume-weighted mean value of growth factor. It can be directly used to simplify the calculation of total liquid water content for the whole particle population.
- 7. Line 143: "... can be calculated from GF_{mean} using the equation above." Please specify which equation. The author should number the formula.*
Response: Thank you for your comment. The formula was numbered and the equation was also updated in the new manuscript.
- 8. Line 152: It seems that the BC information is not used in this study. Is there a need to mention this?*

Response: The BC information was used in the Mie model to calculate the aerosol extinction.

9. *Section 4.2: The Mie theory was used to describe the aerosol effects on visibility degradation. Please describe to what extent this theory can be used in the estimation.*

Response: The Mie model is widely employed to estimate the aerosol optical properties given specific physical and chemical characteristics. To evaluate its applicability in aerosol light scattering calculation, an optical closure study was done.

In the closure study, we have measured aerosol light scattering coefficients at (635, 525, 450) nm from Aurora 3000 nephelometer. We can also calculate the aerosol light scattering at 525 nm from particle number size distribution (PNSD) using Mie scattering model. The comparison between the measured and calculated aerosol light scattering is shown in the figure below. It can be seen that good consistency is achieved between measured and calculated values, which shows both the data reliability and model applicability.



10. *In Fig.7(b): Please accurately replot this panel with the wind direction. I do not understand the color bar, which only shows south wind and north wind.*

Response: Thank you for your suggestion. This figure was updated with both wind speeds and directions in the new manuscript.

11. *Line 290: It's better to specify the Koschmieder relation here.*

Response: The Koschmieder relation was added in the text.

12. *Line 293: Please at least give some descriptions about the calculation method instead of just putting a citation here. Some necessary but not key information can also be offered in the supplement.*

Response: Thank you for your comment. We added some brief description of the calculation process in the new manuscript.