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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Real-Time Aerosol Optical Properties, Morphology and Mixing States under Clear, Haze and Fog Episodes in the Summer of Urban Beijing" *by* Rui Li et al.

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Firstly, we acknowledge the comments of anonymous reviewers, and are also grateful to the efficient serving of the editor. We have already revised MS based on the reviewers' comments. We also inspected MS roundly and corrected some errors in English presentation. We are sure that the revised MS adhere to Atmospheric Chemistry and Physics. The marked MS was also uploaded to be easily reviewed.

Comment 1: Line 259-260: The time range mentioned here is from 28th May to 29th May, but in Figure 1, it is from 24th May to 29th May. Please check and keep in consistency. Response: Line 262: The time range mentioned here is from 24 th May to 29 th May after the careful check. Thus, the "28 th" has been changed into

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"24 th". Thank you for reviewer's chariness. Comment 2: Line 284: How do you obtain the value R=0.603. Response: Line 286: The R value was obtained using Pearson correlation analysis. The R value is the correlation coefficient between AOD and PM10 with a 95% confidence interval. Comment 3: Line 385-389: There might be a misunderstanding of the definition of the internal and external mixing stages. The adjacent particles belong to the category of "inhomogeneous" internal mixing. Please refer to the relative papers for the definition. Response: Line 382-396: Indeed, adjacent particles belong to the category of inhomogeneous internal mixing after my critical review of references. Therefore, the "internal" and "adjacent" were replaced by "internal" and "internal (adjacent)" in Fig. 5, respectively. Comment 4: Line 390: the title of this section may be changed into "Optical properties related to morphological types of aerosols". Response: Line 397: The title has been changed into "Optical properties related to morphological types of aerosols". Comment 5: Line 700: The meaning of "No." in Table 1 is not clear. Response: Table 1: The title has been replaced by "Sampling time and instantaneous meteorological state". Comment 6: Line 710-713: It seems this is not Figure 3, instead, it may be Figure 6. Similarly, Figure 5 in Line 717-720 might be Figure 3, and Figure 6 in Line 721-722 might be Figure 5. Please check this section. Response: Fig 3-6: The figure caption is confused, and right figure caption was added in the manuscript. Comment 7: Line 726 Figure 1: The keys for this diagram are not very clear. The upper one: in addition to rain, fog, and haze days, the clear days should be expressed in white color key. The middle one: what are the meanings of the grey color and orange color? Response: Fig. 1: In the upper diagram, the color column has been added. In the middle one, brown, green, and orange color meant the haze, clear, and fog conditions, respectively, which were added in the figure caption. Comment 8: Line 738 Figure 2: Keys for this diagram should be added. What are represented by those different colors of lines? Response: Fig. 2: Green, purple, red, and blue line denotes the air parcel with the height of 500, 1000, 2000, and 3000 m, which was added in the figure caption. Comment 9: Line 748 Figure 3: Keys in figure 3c are erroneously used. The figure is not consistent with the

description in text of Line 187-188. Response: Fig. 3: I think the Fig. 3 is consistent with the description in text of Line 187-188, no contradictory description was observed. Comment 10: Line 761 Figure 5: The values in the vertical axis should be 20, 40, 60, 80, and 100 percentages. Besides, are the percentages in this diagram based on statistics of the area or number? What about the values of the rainy days? Response: Fig. 5: The percentage in this diagram was obtained based on statistics of number. The main aim of our study is to compare the optical properties and morphologies of particles among haze, fog, and clear, and then decipher the relationship between optical properties and morphologies. However, the optical property and morphology in the rainy days were not set as our main objectives. Thus, the percentage of particles in the rainy days were not included in Fig. 5. Comment 11: Line 766 Figure 6: The types in the classification shown in this figure are not consistent with those in Figure 4. The mineral particle type is missing in Figure 6, and still in this figure, the values of the rainy days are missing as well. Response: Fig. 6: the Ca-S particles and rod belong the same class. The Ca-S particles were changed into mineral and rod was replaced by Ca-S particles. The particles in the rainy days were not included in our study. Comment 12: The keys in Figure 1, 3, and 7 should include those of the clear days (for those white areas). Also, the data for the clear days should be added. Response: Fig. 1, 3, and 7: the white color has been added in the revised version.

Please also note the supplement to this comment:
http://www.atmos-chem-phys-discuss.net/acp-2016-976/acp-2016-976-AC5-supplement.pdf

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