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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 format. The marked MS was also uploaded to be easily reviewed. Comments: 1. The English thorough the whole manuscript should be improved by a native English speaker. Response: The English thorough the manuscript have been improved by an English native speaker. Comments: 2. More recent reports about the influence of agricultural activities including biomass burning on the regional air quality are en-

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couraged to be citied. Response: Many new published paper have been added into the manuscript. Comments: 3. Abstract: Line 12-16, the sentences are suggested to be replaced by “Aerosol optical properties and morphologies were measured by TEM, CRDS, a nephelometer and an aethalometer in a urban site of Beijing from 24 May to 22 June”. The clear, haze and fog episodes just occurred during the sampling period, it didn’t need to mention them in the abstract. The phrase of “sampled from...” is not correct in English grammar. The instruments were used for measuring the aerosol properties, but not for investigating the corresponding changes of the aerosol properties. Line 16- 17, the sentence is meaningless, because the individual episode was mentioned in the following sentences. Line 17-18, the phrase of “which are mostly externally mixed” is not clear, and hence suggested to be changed as “and the particles were mostly mostly externally mixed”. Line 20-21, the comma before which should be deleted, because the phrase is used for modifying the EP-4. Line 21-22, “industry-induced haze (EP-1) and biomass burning-induce haze (EP-5)” is suggested to be changed as “the industryinduced pollution episode (EP-1) and biomass burning-induce pollution episode (EP-5) Line 22-24, The two sentences seemed to be independent, lack of logic, and thus, the two sentences are suggested to be replaced by “Compared with the EP-2 and EP-4, the AOD values and the size distribution of particles during EP-1 and EP-5 were much greater because of relatively high particle concentrations ”. Line25-26, the sentence was suggested to be replaced by “In contrast to the EP-1, a large fraction of soot which sticks to KCl, sulphate or nitrate particles was detected during the EP-5”, implying the evident influence of severe crop residue combustion. Line 26-28, the sentence was suggested to be replaced by “Additionally, evident enhancement of light absorption was observed during the EP-5, which was mainly ascribed to both BC acceleration and other absorbing substances”. Line 28-31, the sentences are better replaced by “However, soot was found mostly internally mixed with sulphate and nitrate during a soot fog episode (EP-3), resulting in evident enhancement of light absorption”. Response: Line 16: The sentences have been changed into “Aerosol optical properties and morphologies were measured by TEM, CRDS, a nephelometer and an

aethalometer in a urban site of Beijing from 24 May to 22 June". Line 17: Indeed, the sentence is meaningless and has been deleted. Line 23:"which" was replaced by "and the particles". The comma has been deleted Line 27: the sentences has been changed into "industry-induced haze (EP-1) and biomass burning-induced haze (EP-5) were both affected by the south air mass". Line 27-28: The two sentences have been replaced by "Compared with the EP-2 and EP-4, the AOD values and the size distribution of particles during EP-1 and EP-5 were much greater because of relatively high particle concentrations." Line 32-35: The sentence was replaced by "In contrast to the EP-1, a large fraction of soot which sticks to KCl, sulphate or nitrate particles was detected during the EP-5". Line 35: The sentence was replaced by "Additionally, evident enhancement of light absorption was observed during the EP-5, which was mainly ascribed to both BC acceleration and other absorbing substances". Line 39: The sentence has been changed into "However, soot was found mostly internally mixed with sulphate and nitrate during a soot fog episode (EP-3), resulting in evident enhancement of light absorption". Comments: 4. Line 44-47, any kind of particles in the atmosphere have scattering effect, why did you only stress on inorganic salts and light-color organic carbon? The sentences is better replaced by "inorganic salts and light-color organic carbon have a "cooling effect" on climate due to decreasing permeation of solar irradiation onto the Earth's surface through solely scattering sun light". There are still some sentences in the section being needed to be improved. Response: Line 57-58: Indeed, the sentence has been changed into "inorganic salts and light-color organic carbon have a cooling effect". Comments: 5. Line 266-267, the sentence of "the north wind was relatively clean and the time was insufficient for a heavy accumulation" is not proper and clear. Wind can be only described by speed and direction, and hence the sentence is better replaced by "the air parcel from the North was relatively clean". What's "the time" in the latter half sentence"? Line 282, the title of "Optical parameter variation" is better replaced by "The variation of aerosol optical characters". Line 324, the title of "TEM analysis" is suggested to be "Morphology and chemical composition of aerosols". Line 319: "Especially when air masses moved from south direction to

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the sampling site aerosols were influenced by heavy soot-sulfate-OC-mixed pollution". How did you draw the conclusion? Line 388: Are you sure haze and fog episodes had a high possibility of collision just due to the heavy particle loading? You should add relevant reference to confirm your deduction. Line 390, the title of "Optical properties related to morphological of aerosols" is better replaced by "the relationship between the aerosol optical properties and morphologies". Response: Line 280: The sentence was changed into "the air parcel from the North was relatively clean". Line 295: The sentence was changed into "The variation of aerosol optical characters" Title 3.3: The title was replaced by "Morphology and chemical composition of aerosols" Line 334: The conclusion was drawed because some previous studies have confirmed that soot, organic matter, and sulfates were generated from the industrial activities, domestic cooking, and biomass burning. Many industrial activities and biomass burning have been observed in South China. Line 404: Haze and fog episodes generally had a high possibility of collision, which was caused by heavy particle loading. In addition, prolonged remaining of heavy particles was also a factor leading to the collision. Many relevant references have been added in the manuscript. Line 407: The title was replaced by "the relation of optical properties and the morphologies of aerosol particles".

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