

***Interactive comment on* “Characterization of individual aerosol particles collected during a haze episode in Incheon, Korea using the quantitative ED-EPMA technique” by H. Geng et al.**

Anonymous Referee #1

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General comments:

In this study, the low-Z particle EPMA was applied to analyze the aerosol particles collected before and during a haze episode at Incheon, Korea, in October 2008. Characteristics of the particles in non-haze and haze durations were compared. A number of original results were obtained, in particular the contributions of different kinds of particles in the differential size ranges of 2.5-10 micron meter and 1.0-2.5 micron meter. However, the descriptions of many parts are very tedious and some discussions are too speculative and lack of evidence of this study (refer to the Details of the major comments). Before it can be accepted for publication, major revisions are necessary.

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Major comments:

1. Abstract:

(1) It is tedious. The 3 sentences at the beginning are not necessary. Moving them into the introduction will be better.

(2) It is hard to follow the descriptions of the major results.

(3) The last sentence 'It is hypothesized that . . .' does not show any importance of this study. It could be expected without the results of this study.

2. Introduction:

(4) The definition of haze in Korea and more details on the weather and environment conditions for haze occurrence around Incheon will be very helpful for readers to understand the results.

3. Materials and Methods:

(5) The reason for particles on stage 1 not to be analyzed is necessary.

(6) Haze information needs to be shown in Table 1 in order for reader to remember which samples were from non-haze period and which from haze episode.

(7) The methods are not effective to organic carbon compounds. In this study, criteria and approaches for organic component identification in the analyzed particles are definitely needed.

4. Results and discussion:

Subsection 3.1 Particle types: This subsection is very tedious.

(8) It is unnecessary to repeatedly to show multiple particles in the same category. One picture for particles before the haze and one picture for particles in the haze are better than several pictures (figure 3). For each category particles, one particle shown as an example is enough.

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(9) For each category, introduction of the research background is not necessary. The results of this study need to be emphasized in a compacted way. A table summarizing all categories might be a good choice. In addition, many possible sources for the particles are mentioned but no further information is shown to identify the contributions of each possible source. It is likely all possible sources are raised, but readers cannot know where the particles were originated from after reading the paper.

(10) Page 26648 line 3: 'possible due to the electron beam'. This description is vague. Authors analyzed the particles and must have data to make it clear.

(11) Page 26649 line 2-5: Adachi and Buseck (2008) did not discuss water-soluble organic aerosols. Johnson et al. (2008) clearly mentioned that it would be impractical to discuss oxygenated organics with any certainty and did not show any points on water-soluble organics in their samples.

(12) Page 26649 line 7: Adachi et al. (2010) only suggested the condensation without any evidence, and thus the suggestion cannot be applied as a support for the conclusion here.

(13) Page 26649 line 18: '[Na]:[Cl]≈1:1'-The low-Z method always overestimates the content of Na in an individual particle. In the case of [Cl] loss caused by nitric acid or organic acid, the loss cannot be identified correctly. In that case, how was the ratio determined? Note that nitrogen compounds and organic compounds are well discussed in following sections.

(14) Page 26650 line 6-7: Geng et al., (2009a; 2009b; 2010) did not report any results of this study.

(15) Subsections 3.1.5 and 3.1.6 contain rare data and information of this study, except the pictures of the particles. They can be largely simplified.

(16) Page 26651 line 26-28: Is the subway system a substantial source for iron particles in a wide range? Evidence is necessary for that the detected particles in this study were

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from the source.

Subsection 3.2 Relative abundances of various types of particles: Important results are reported in this subsection, but more discussions on the reasons of the quantitative results and their implications are anticipated.

(17) Page 26652 line 21-27: These results and conclusions are very important to the understanding of particles of haze phenomenon. Mechanisms or sources responsible for these results need to be discussed clearly in order to make them referentially meaningful. In addition, how did the differences of the contributions of different particles influence the haze properties?

(18) Page 26653 line 15-21: Evidence from this study is necessary to support the discussions here. Without the data of this study, the discussion did not increase the readership.

Subsection 3.3 Possible reasons . . . : The discussions are tedious and they are only published literatures without combining with the situation or conditions of this study. Data and evidence from this study are necessary to show that those discussions are suitable to this study. In particular, authors raised every possibility that could be expected but did not show which possibility was the major one. This leaves me an impression that it is likely that authors have explained their results but I do not understand how the authors did provide a clear answer.

(19) Page 26654 line 4-7: The paper Jung et al. (2009) is not cited properly. The weather conditions of Guangzhou must be very different from those at Incheon, and I do not think anthropogenic emissions relevant to haze are comparable at the two cities.

(20) Page 26654 -26656: The discussions were not prepared closely in conjunction with the conditions, situations, and aerosol data of this study. Most of the contents are published literatures. How are those elucidation and explanation suitable to the results of this study?

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(21) Page 26656 line 17-29: These discussions are suitable to any air parcels arriving at Korea from eastern China. Authors should give evidence of this study to show the links between their results and air parcels from eastern China in this study. Otherwise, the discussion should be largely simplified.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 26641, 2010.

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