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Interactive comment on “Chemical composition and mass size distribution of PM_{1.0} at an elevated site in central east China” by Y. M. Zhang et al.

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We appreciate your thorough review of the manuscript and valuable comments which helped us to improve the paper. We have revised the paper carefully and our point-by-point responses are detailed below.

Q: “first, sections 3.3–3.5 contain the most valuable new information from the conducted measurements. While these sections report the main findings, they lack clear scientific conclusions. The few attempts toward this direction have often erroneous interpretations. For example, the authors link low aerosol mass mean diameters to nucleation events (lines 3–5 on page 15200). It is true that less aged aerosols tend to have a smaller mass median diameter, but nucleated aerosols are very unlikely to be respon-

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sible for the small mass median diameters. It is rather other way around: air masses with lower mass median diameters tend to be younger/cleaner, making nucleation more probable. As another example, I do not understand how aerosol hygroscopicity would contribute its growth (lines 12-13 on page 15200)."

A: Accepted. First of all, we re-organized the contents of section 3.3 according to the durations that were influenced by the conditions of planetary boundary layer, low free troposphere, new particle formation, in cloud and aged events. With each condition, the mass concentration, mass-resolved size distribution and their proportions on different size ranges were discussed in detail. We removed the discussion of the relationship between small aerosol mass mean diameters and nucleation events.

Secondly, in section 3.4, we polished the contents and improved interpretations about the back trajectory results to clearly show the conclusions.

Thirdly, in section 3.5, PMFs was employed to categorize OA into different types of organics. We re-run the dataset with both PMF and ME-2 to make sure the results are consistent. Results present BBOA should be categorized as one subtype of OA in fall, and some modification was also done in winter.

Q: "second, I am not fully satisfied with the selection of sites for the comparisons made in sections 3.1 and 3.2. Why this set of sites? I would have liked to see comparisons to aerosol chemistry at other elevated sites all over the world, rather than picking up e.g. urban sites from here and there. One more thing: while the first part of Table 1 contains short description of the type of site, the second part of this table does not!"

A: We accepted these suggestions on site selections. At the early version of this MS, we only considered the comparison of the MMDs of chemical species between our site and other sites with size distribution data. A new Table1 has included more comparisons on chemistry of particles in different size ranges from more elevated sites. Because the content of section 3.3 has been modified into five kinds of episodes for discussion, table 2 and table 3 were replaced by figures accordingly (Figure 3, 4, and

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5).

Q: “the introductions (section 1) have multiple problems. The first paragraph and beginning of the second one in it are very difficult to understand. More specifically, it remains unclear how the beginning of introduction motivates the research make in this manuscript. The introduction does not state clear scientific goals for this work either. It is modest to stating that the purpose is to assess regionally representative concentration levels and obtain seasonal variations.”

A: Accepted. The discussions in the Introduction have been improved, the scientific goals for this work were stated more clearly, which are to improve the understanding of regionally and seasonally representative chemical components in PM₁, and related formation and transportation processes.

Q: “Finally, no figures have been presented on the actual results (all the information is in Tables). This makes it very difficult for a reader to digest the results.”

A: Accepted. Some unnecessary tables (table 1, 2, 3 in old version) were deleted, and new tables (table 1, 2 in new version) were added. Figures (new figures 2, 3, 4, and 5) were added to better show major results. Some reorganization of figures has also been done (figure 1 and figure 2 in the old version were changed to figure 6 and figure 1, respectively).

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 15191, 2014.

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