**Atmospheric
Chemistry
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Discussions**

Interactive
Comment

Interactive comment on "Atmospheric aerosol compositions in China: spatial/temporal variability, chemical signature, regional haze distribution and comparisons with global aerosols" *by* X. Y. Zhang et al.

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Responds to the comments from Anonymous Referee #5

"This paper presents a summary of speciated PM10 monitoring performed over a two year period at sites rural and urban sites throughout China. The data are of potentially great interest, but little description is given of the measurements or their quality. Moreover, many of the results are presented in terms of derived quantities whose relationship to the measurements is not specified. Some of the figures are missing information

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Interactive Discussion

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needed for their interpretation, and others compare apples with oranges. This draft needs substantial work for it to do justice to the measurements it describes. Examples follow of the kinds of issues needing attention."

A: Thank you for the careful review of the manuscript. We have substantially revised and polished the paper by careful proofreading.

"The authors' XRF measurements are described only in generic terms, with no reference to any source of more detailed information on calibration, spectral deconvolution, or performance measures such as detection limits. The samples were collected on quartz microfiber filters rather than Teflon membranes, and were analyzed for such light elements as Na and Mg – were corrections made for attenuation of their lowenergy x-rays signals? Were any comparisons done between Na, Mg, S, K, and Ca from XRF and Na+, Mg2+, SO4=, K+, and Ca2+ from ion chromatography?"

A: The measurement XRF technique used in this study is rather standard, which has been used in many network observations of PM10 around the globe [such as, Chow, 1993]. We will provide some references and information for more detailed information on calibration, spectral deconvolution in the revised manuscript. We will also give some descriptions related with the comparison between our XRF and ion chromatography results, but in China large fractions of Na, My, K, Ca etc are still attributable to insoluble components.

"The authors find "mineral aerosol" to be the largest aerosol component in China but give no indication of how they determine "mineral" concentrations, presumably from the XRF elements. Are they simply a multiple of Fe? If so, what multiple is assumed? Or do they represent some combination of elements, with estimates of the (unmeasured) Si and Al?"

A: The mineral dust determination has been discussed in our previous work (Zhang et al. J. Atmospheric Chemistry 44, (2003) 241-257). We used Fe (4% of mineral dust) to calculate the mineral dust fraction in our PM10. We have added briefly description in

the revised manuscript. Because of no Si and Al data obtained, we just can use Fe to estimate the mineral dust fraction..

"Figure 2 has the form of a box-and-whiskers plot for the distributions of major chemical species. The y-axis is labled as concentrations (ug/m3) on one side of the plot and fractions (%) on the other. It is hard to know what this means! To see that these two quantities are not identically distributed, it suffices to consider a pure ammonium sulfate aerosol at different concentrations in the atmosphere: the distribution of concentrations can be broad, but the % fractions of sulfate and ammonium are all the same."

A: In fact, Figure 2 is the synthesis of two diagrams. "Open circle" denotes the percentage of each chemical species of PM10. One hard to find and notice the "Open circle" marked in the y-axis. We have revised the text and clarify this.

"Figure 4 places PM10 concentrations in China in a global context. But the US values, mostly from Malm and Schichtel (2004), are for PM2.5, not PM10. This renders comparisons meaningless for the "mineral" component."

A: Thank you for mentioning this. We have put more explanations associated with this, especially for mineral dust comparison.

"Figure 5 shows stacked-bar charts of individual sites species concentrations, but omits a legend identifying the species colors. They are clearly not the same as those used in Figure 4."

A: Added..

"My concluding suggestion would be to separate the discussions of aerosol composition and of haze into different papers, since this manuscript gives little attention to the connection between them and an adequate treatment of the composition measurements and data will by itself substantially increase its length."

A: This really is a big suggestion. Due to the high relationship between aerosol and haze, and also because the haze part does not increase too many of the length of the

manuscript, we still want to leave the haze part in one manuscript without too much structure changes. The haze part do provides many useful information, such as the distribution of major haze regions etc. in China.

Please also note the supplement to this comment:
http://www.atmos-chem-phys-discuss.net/11/C12169/2011/acpd-11-C12169-2011-supplement.pdf

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 26571, 2011.