Atmos. Chem. Phys. Discuss., 11, C12121–C12123, 2011
www.atmos-chem-phys-discuss.net/11/C12121/2011/

Atmospheric Chemistry and Physics Discussions

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.

Anonymous Referee #5

Received and published: 21 November 2011

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 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.

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 low-energy 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?

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?

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.

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.

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.

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.

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