Atmos. Chem. Phys. Discuss., 11, C3399–C3402, 2011
www.atmos-chem-phys-discuss.net/11/C3399/2011/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Aerosol optical properties in the North China Plain during HaChi campaign: an in-situ optical closure study" *by* N. Ma et al.

Anonymous Referee #2

Received and published: 16 May 2011

GENERAL

This is a good paper presenting results of aerosol optical properties and size distributions in one of the most polluted areas of the world. These measurements are important both for climate modeling and describing air quality in North China. Nowadays there are already fairly many papers published about similar measurents at relatively near-by sites, as also the authors refer to in section 4.1.1. In the present paper I didn't find much really new compared to those articles. I wish you could highlight the most important differences between your results and those presented in the above-mentioned papers, in addition to the different average absorption and scattering coefficients that

you already mention. In any case, I do recommend the publication of this work in ACP, after some small revisions.

DETAILED COMMENTS

P.9571,L 6-7. Your "winter" campaign was from 6 March to 5 April. Don't you consider this spring? Doesn't the vegetation start producing secondary organic aerosol already in March at these latitudes? It starts in March even more norther. Ok, but this is not an important point, just consider it.

P 9573, L7. You write "A Tandem Differential Mobility Particle Sizer (TDMPS, IfT, Leipzig, Germany) (Birmili et al., 1999) was used to..." Well, Birmili et al. talk about "Twin Differential Mobility Particle Sizer", not Tandem. The word "Tandem" is in a way reserved for using for instance with VTDMA and HTDMA.

P9573, L10-12, You write about combining the DMPS and the APS data. How did you deal with the overlapping range? How about converting aerodynamic diameters to mobility diameters: what density did you use and based on what?

P9754,L6-7 "To obtain the size-resolved volume fraction of BC, the BC mass size distribution observed in CAREBeijing (Cheng et al., 2009) was used in this study." This is fine. But did you use just one size distribution, in Cheng's paper the BC size distributions varied. And to help the reader of the present paper, I hope you would give also some actual numbers describing the BC size distribution, for example mode diameter and mode width, size range, or some other concrete measures of the size distribution.

P9577, L13. What is SDZ? You don't define it anywhere.

P9578, L5-6. " ... a wavelength correction for aerosol absorption is applied to the measured absorption coefficient using an empirical approach, ... with the absorption exponent = 1 ... (Bodhaine, 1995)." This is the only somewhat serious point about this paper, and the correction requires some extra work. Qualitatively your results will remain the same, just the numbers change. The point is that the Ångström exponent of

absorption varies quite a lot, depending on the source of soot. The paper of Bodhaine deals with aerosol measurements at real background sites, very different from yours. At your site I am sure there are many different sources: open biomass burning, coal combustion, diesel engines etc. that all produce soot with different wavelength dependency of absorption. Now you are "extrapolating" from one wavelength, 637 nm to 550 nm, which is a long wavelength interval. This creates quite a lot of uncertainty to your results. So, I suggest you interpolate your scattering coefficients to 637 and present all SSA results at that wavelength. The uncertainty would definitely be smaller.

P9579 L9. Here you mention the "calm winds" for the first time. How do you define that? Is that for example v < 1 m/s or what?

P9583. L14-19. "It should be noticed that only a small part of the measured data is in the range of the corresponding calculated values for internal and external mixture, as shown in Table 3. The ratios of measured data that enclosed by the calculated values are low, varying from 1.6% to 84.4% for different wavelengths and parameters." I don't understand these sentences at all. And I don't understand Table 3 at all either. You are talking about ratios. Ratio is something devided by something else, for example the ratio of A to B is A/B. What are you dividing by what to get Table 3? And what do you mean by "enclosing"? I don't want to be picky, I just don't understand. Please clarify the text and the caption.

P9599, Table 6. Here is the same problem as in my previous question. The table title is "Ratios of ..." What is divided by what? A ratio equals division. Please clarify the caption and also the associated text on P9585 L15-18.

P9602, Fig 3. The sublots have quite a lot of information, in my opinion too much. I think it would make sense to separate the wind frequency distribution as two separate subplots. Then the other thing about this plot is the dash-dot lines, that stand for average values in each direction: I don't see any scales for them. What is the "ten to the power m/s" in each subplot?

Finally: why don't you present also mass scattering and absorption efficiencies?

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 9567, 2011.