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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Attribution of aerosol light absorption to black carbon, brown carbon, and dust in China – interpretations of atmospheric measurements during EAST-AIRE" *by* M. Yang et al.

Anonymous Referee #1

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The paper provides a nice and interesting analysis of the optical properties of sub- and super-micron atmospheric aerosols during the EAST-AIRE field campaign. The measurements have been obtained with “traditional” instrumentation (multi-wavelength nephelometer, aethalometer and PSAP) but the data treatment and analysis is original and yields relevant and interesting results. The used method is sound and does not contain flaws or shortcomings; in fact it should be taken as an example for future data treatment or re-analysis of available data from previous campaigns where this instrumental set-up has been in use.

Below are listed a few minor comments:

- Suggest mentioning in the abstract that the MAE for brown carbon is actually a lower limit value.
- Page 10917 line 1: “. . . increased by 30% as a result...”: increased compared to what?
- Page 10919 line 16: a particle number over 10^4 cm^{-3}: what is the lower cut-off diameter?
- Page 10919 line 20: “. . . humidity below 40%”: this is the campaign average, but how did the humidity vary from day to day? Was the sampled air brought at a standard RH for the scattering measurements? If not, how would this affect the results?
- Page 10920 lines 3-21: I feel this belongs rather to the introduction section. (Line 15: Filter should be Filters)
- Page 10920 lines 7: “..might have been enhanced..”: compared to what?
- Page 10921 line 17: “attenuation” needs a definition.

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- Page 10921 line 24: I presume the origin of this equation is explained in more detail in Yang (2007), so rather provide this reference already at this point.
- Page 10922 line 11: suggest “We can remove much of the apparent variability. . . ”
- Page 10925 line 4: what is the motivation for using an effective density of 2 g cm^{-3}?
- Section 3.2 may be structured a bit more, e.g. by making sub-sections for each of the end-member air masses, and referring to figure 5 when appropriate – as would be the case on page 10929 line 18-19. Apparently biomass burning air masses are not discussed? Lines 3 to 5 of page 10930 would fit better immediately before “The fine absorption and scattering fractions. . . “ (line 1).
- Page 10930 line 12-13: does this really indicate coarse particles, or could it also be more accumulation mode particles?
- Page 10930 line 15: what is meant with the typical atmosphere?
- Page 10930 line 24: suggest: “a likelihood reinforced by the relatively strong wavelength-dependence”.
- Page 10932 line 16: encapsulation may indeed be a possible explanation, but also the fact that the BC absorption Ångstrom exponent is not exactly one. How sensitive are the resulting MAEs on this assumption? A small sensitivity analysis would be welcome.

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