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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.

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Review of the manuscript entitled : Attribution of aerosol light absorption to black carbon, brown carbon, and dust in China – interpretations of atmospheric measurements during EAST-AIRE by M. Yang, S. G. Howell, J. Zhuang, and B. J. Huebert

This paper documents the absorption of the aerosol during an intensive the EAST AIRE campaign. It focuces on the SW and near-IR fot the black carbon, brown carbon and dust components. The campaign is representative of a 24days period for a polluted

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Interactive Discussion

Discussion Paper

site, Xianghe, 70km east of Beijing. The work focuses on the different absorbing properties and builts upon previous works of Bond et al., 1999; Weingartner et al., 2003 and Arnott et al., 2005. The ambient conditions and the proximity of pollution sources make it likely that the dust analyzed in this experiment could very is coated with NO3 or SO4 as the authors suggest. Hence the optical properties revealed by their measurements will be that of the mixture and not of desert dust that would not been mixed with polluted air. The likelihood of the black carbon being coated by a scattering aerosol layer in these measurements leading to an increased absorption efficiency appears to be backed up by the values of mass absorption efficiency that are 20 to 30% higher than that assumed for pure soot.

This paper goes further than documenting the mass absorption efficency of the aerosol as the analytical tools used here document also its spectral variation in the SW and the values of both the scattering Ängstrom exponent and the absorption Ängstrom exponent. The authors are able to do so by selecting end members cases that they sort in 5 groups: coal pollution, dust, biomass burning, fresh chimney plume and background air. For these significant results, the paper should be published in ACP after following minor revisions:

I have a similar remark than reviewer 1: why use 2 different densities for dust in the paper? Page 10925 line 4 you use 2.0 g.cm-3 whereas in part 4, a more common value of 2.6 g.m-3 is used?

Paragraph 3.1 lines 14 to 27: this part of the description that leads to the classification scheme should be clarified for the reader. Could you more clearly state how you came up with the criteria stated in Table 1. Are lines 14 ro 27 necessary for the rest of your argument? If yes, explain better how you were lead to choose these criteria.

Paragraph 3.2: please indicate that the scattering Ängstrom exponent of dust show very large variations that could be caused by: different mineralogy, size distributions or coatings. Can you explain in a simple way why BC has a low absorption Ängstrom

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exponent ?

Page 10931 last line and page 10932 line 1: “We can further assume that BC is the only significant light absorber at 950 nm, since both brown carbon and dust absorb weakly in the near-IR” please give a reference for both.

Paragraph 4.2 You should mention the work of Putaud et al., 2004 that illustrates very well that the nitrate fraction is found in the coarse mode in the presence of dust whereas it is in the fine mode the air is devoid of dust.

Putaud, J.-P., Van Dingenen, R., Dell’Acqua, A., Raes, F., Matta, E., Decesari, S., Facchini, M. C., and Fuzzi, S.: Size-segregated aerosol mass closure and chemical composition in Monte Cimone (I) during MINATROC, Atmos. Chem. Phys., 4, 889–902, 2004, SRef-ID: 1680-7324/acp/2004-4-889.

Once these minor changes are made, this paper can go into ACP.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 10913, 2008.

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Interactive Comment