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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Ambient black carbon particle hygroscopic properties controlled by mixing state and composition" *by* D. Liu et al.

Anonymous Referee #1

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This manuscript deals with black carbon and hygroscopic properties of aerosols. The study is based on one month (according to figures) measurement period in east coast of United Kingdom. In the manuscript data from SP2, HTDMA and SP-AMS are analyzed and a model is introduced to predict growth factor of BC containing particles. The conclusion of the manuscript are 1. Besides less hygroscopic mode (gf $\sim$1.05), a more-hygroscopic (gf$\sim$1.4-1.6) mode of BC particles was observed. 2. Gf was observed to be highly associated with inorganic compounds like nitrate in aerosol. 3. Gf was suppressed with organics in the core of BC aerosols 4. Given that nitrate is more rapidly formed compared to sulphate in polluted plumes and its ubiquitous presence in many areas, it will significantly enhance the hydrophobic-to-hydrophilic conversion of BC particles, leading to reduced atmospheric lifetime of BC in regionally polluted air masses.

The subject of the manuscripts fits into the scope of ACP. The manuscript presents data from rather short measurements campaign with novel instrumentation. Although the science and conclusions are rather thin paper presents some nice results. The manuscript gives and impression that there were also other measurements conducted at the same time. If this is the case it would be good to present at least some numbers or overview of these measurements to get broader picture. The scientific methods are valid and clearly outlined. The rather small amount of data does not give possibility to very firm conclusions on the overall faith of BC, just some case studies on one season. However the conclusion drawn here is supported by the measured data. The language of the manuscript is fluent. Although the analysed measurement period is short the which leaves the scientific output and usability of the data rather shallow I recommend this to be publishes in ACP.

Other comment and suggestions; page 28960 line 6, Penket et al, 1999; is this on the reference list

page 28961, line 13; what other absorbing substance are, and how much compared to BC

page 28962, line 29; DeCarlo et al, 2004 ; is this on the reference list

page 28964, line 5; DeCarlo et al, 2006 ; is this on the reference list

page 28964, line 15 and table 1; is something else measured, I miss information on CN, etc. . .

refences; is

McFiggans, G., Artaxo, P., Baltensperger, U., Coe, H., Facchini, M. C., Feingold, G., Fuzzi, S., Gysel, M., Laaksonen, A., Lohmann, U., Mentel, T. F., Murphy, D. M., O'Dowd, C. D., Snider, J. R., and Weingartner, E.: The effect of physical and chemical aerosol properties on warm cloud droplet activation, Atmos. Chem. Phys., 6, 2593–2649, doi:10.5194/acp-6-2593-2006, 30 2006. refered in the text

in the text McMeeking et al., 2011 is refered but on the reference list the year is 2011

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 28955, 2012.