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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Correlation of black carbon aerosol and carbon monoxide concentrations measured in the high-altitude environment of Mt. Huangshan, Eastern China" *by* X. L. Pan et al.

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The authors appreciated Prof. Andreae's valuable comments and suggestions on the improvement of this manuscript. Our replies are presented as follows: Comment 1: they report that measurements of "BC" were made with a MAAP instrument at 670 nm. A recent report has shown that the MAAP, contrary to the manufacturer's speciïňĄcation, actually measures attenuation at 637 nm (Müller et al., 2011). Reply: Authors agreed with the statement that actual peak wavelength of LED light source of MAAP was about 637(+/-)1 nm, not nominal wavelengths of 670 nm as specified by the man-

ufacturer. Authors would like to correct this minor error in the context, and add some discussion from the inter-comparison workshops.

Comment 2: Second, the authors state that they have compared their MAAP results with measurements of "EC" by a Sunset Labs thermo-optical analyzer and found a difference of 50% between the BCe from the MAAP and the ECa from the Sunset Labs (for my terminology, see Andreae and Gelencsér, 2006). They then state (page 4453, line 13):"Here, we employed a factor of 1.4 in converting the MAAP-measured BC mass concentration to an "EC" category." Yet, in the rest of the paper the term "EC" never appears again, and the reader wonders whether the "BC" in the paper is actually the BC as reported by the MAAP, or the "EC" as recalculated by dividing the MAAP data by 1.4? In the latter case, they should report their results as ECa.

Reply: Authors agree with your viewpoint that terminology of "EC" and "BC" are from different definitions based on source processes, morphological characteristics, chemical composition and optical properties, and both of them are "proxies" for the concentration of soot carbon. Since "EC" in most case refers to the fraction of carbon that is oxidized in combustion processes which also highly related with primary emission of Carbon Monoxide, operational conversion of "BC" to "EC" by dividing MAAP data by a empirical factor was utilized instead of directly use of "BC" in the manuscript. Just as you mentioned in the comment and literature (Andreae et al., 2006), "ECa" which was corrected for charring effects seems more plausible in this study, we will accept your suggestion by using ECa instead of BC in the context. Regard to conversion factor, Measurements at Mt.Taishan(36.26N,117.11E,1534 m a.s.l.,located in the middle of Central East China) showed that BC(PM1) concentration from MAAP results was systematically about 54% and 7% higher than those from EC(Sunset, NIOSH protocol) and Heated_PASP. Recently studies at Tokyo (urban site) and Fukue island (remote marine site) indicated that MAAP derived BC concentrations were higher by factors of $\sim$1.6 and 1.44 than results of COSMOS (detailed information were described in detail in manuscript, "Measurements of black carbon mass concentrations by COSMOS and

MAAP on a remote island Fukue and in central Tokyo: comparisons and sensitivity to dust particles", under review), Herein we took lower limit of 1.4 because of limited anthropogenic emissions at surrounding area of the observation site in Mt.Huangshan.

Comment 3: Third, the authors use two types of properties, a mixing ratio (ppb) in the case of CO and a mass concentration (ng m-3) in the case of “BC”. While the former is invariant to changes in temperature and pressure, the latter will change with altitude (pressure) and temperature. This is especially important when reporting data collected at altitudes much greater than sea level, as in the present case. Such data must be corrected to standard conditions (273.15 K and 1000 hPa are recommended by IUPAC) and correction must be explicitly stated.

Reply: Author would like to correct our results to standard conditions. Reply to others issues: The technical errors in the context will be corrected.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 4447, 2011.