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Interactive comment

Interactive comment on "Evaluation of the absorption Ångström exponents for traffic and wood burning in the Aethalometer based source apportionment using radiocarbon measurements of ambient aerosol" *by* Peter Zotter et al.

Anonymous Referee #4

Received and published: 10 November 2016

Summary: The analysis outlined in this manuscript utilizes concurrent Aethalometer and 14C measurements from various locations throughout Switzerland to (1) determine absorption Ångström exponents for BC from vehicle emissions and from wood burning emissions, (2) assess Aethalometer measurements and absorption Ångström exponent values in different geographical contexts, seasons, and conditions, and (3) Assess MAC values for different BC sources.

General Comments: Very well written, I found very few technical corrections. Authors should expand on discussion of uncertainties and implications associated with

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Discussion paper

choice of Aethalometer correction algorithm, with particular emphasis on how corrections can affect absorption Ångström exponent. Throughout manuscript: For consistency in the field, please consider using the terminology 'Equivalent Black Carbon', or EBC, to describe measurements of BC from optical absorption methods (in this case, the Aethalometer), as described in Petzold et al. (2013. From Petzold et al. (2013): "Equivalent black carbon (EBC) should be used instead of black carbon for data derived from optical absorption methods, together with a suitable MAC for the conversion of light absorption coefficient into mass concentration."

Specific Comments: Page 5, Line 4-6: The literature suggests that absorption Ångström exponent is affected by choice of correction algorithm, though these impacts are not well outlined (Collaud Coen et al., 2010). Parts of the correction schemes that contribute to wavelength dependence include: (1) filter loading artefact, (2) discrepancy between scattering and backscattering effect, (3) effects of particles getting embedded in filter material. Since absorption Angstrom exponent is the main focus of this paper, it may be prudent to mention here that your results might be sensitive to your choice of correction algorithm, even if it's not clear exactly how. This is future work that needs to be done. Page 5, Line 27-29: Citations needs for BC and traffic absorption Ångström exponent numbers, and for claim that traffic emissions contain mainly BC. Page 5, Line 36-38: Great that you are addressing this assumption in the context of the specific geographical area in which the measurements are taken. Are emissions from dust, light absorbing SOA, biogenic emissions also negligible in this region? Maybe there is a source to cite here to address the validity of this assumption, or maybe not. Page 9, Lines 11-29: Shouldn't you compare your MAC value here to the MAC values that are automatically programmed and preset in the Aethalometers? They are available in the AE31 manual. Page 14, Line 15: Nowhere is it specified or explained what OM is in Equation 16. It presumably organic matter, but should be stated explicitly in the text for readers unfamiliar. Figure 1 & Table 1: Would be useful to state in the text how station types were determined; for example, what is the difference between urban, background vs. urban, traffic, etc.

Technical Corrections: Page 13, Line 4-5: There are a few commas missing that make this sentence difficult to read. The sentence should read: “However, as shown here, the choice of the wavelengths, especially the one in the N-UV range, and αWB are not independent”. Page 14, Line 13: “apportioned” should be “apportion” so the sentence reads: “It has been attempted to also apportion the total carbonaceous. . .” Page 15, Line 13: should specify absorption Angstrom exponent.

References:

Collaud Coen, Martine, et al. "Minimizing light absorption measurement artifacts of the Aethalometer: evaluation of five correction algorithms." Atmospheric Measurement Techniques 3 (2010): 457-474.

Petzold, Andreas, et al. "Recommendations for reporting" black carbon" measurements." Atmospheric Chemistry and Physics 13.16 (2013): 8365-8379.

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