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Atmospheric Measurement Techniques Discussions

Interactive comment on "A two year's source apportionment study of wood burning and traffic aerosols for urban and rural sites in Switzerland" *by* H. Herich et al.

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The apportionment of light-absorbing carbonaceous aerosols (i.e. brown/black carbon) has recently become a subject of growing interest for air quality monitoring networks and policy makers. Moreover, owing to the impacts of wood burning emissions on air quality during the winter season in Europe, the development of methodologies allowing the apportionment of this particular carbonaceous aerosol source is of primary importance. In this respect, the AMT-2010-145 manuscript, presenting the first trial to use multi-wavelength Aethalometer data for BC source apportionment purpose on long-term datasets, does address relevant scientific questions within the scope of AMT.

This manuscript aims at presenting novel tools to evaluate Fossil Fuel (FF) combustion and Wood Burning (WB) contributions to Black Carbon (BC)loadings and reaches substancial conclusions. The proposed methodology is described in a way that it can be easily reproduced by fellow scientists. The title clearly reflects the content of the paper, and the abstract provides a concise and complete summary. The overall presentation is well structured and clear, and the language is relatively fluent and precise. Mathematical formulae, symbols, abbreviations, and units are correctly defined and used.

However, in my opinion, the following two major comments need to be properly taken into account before final acceptance:

- Authors claim that the Aethalometer model proposed by Sandradewi et al. (ES&T, 2008a) is not applicable to long-term datasets as it is only valid for situations where non-combustion carbonaceous aerosol sources may be neglected (e.g., in winter). It is surely true, but not a new finding! Sandradewi et al. (ACPD, 2008b) and Favez et al. (ACP, 2010) further proposed improved versions of the "Aethalometer model" allowing for the apportionment of non-combustion carbonaceous aerosol sources. To apply this improved methodology to long-term datasets it would be worthy to scrutinize short-time periods (e.g., month, season) separately. In this respect, paragraph 3.2.1 (and related discussions within the introduction and conclusion) should be eliminated, or at least rewritten.

- Authors suggest a rather simple methodology to assess the wood burning contribution to BC (equation 5). This methodology seems to be valuable since obtained results are in good agreement with independent datasets used as indicators of wood burning and traffic emissions. However, the robustness and uncertainties of the proposed methodology might be further investigated. In particular, the uncertainty evaluation should take into account the impact of the following hypotheses: 1) In equation 5, σabsFF(880nm)and σabsWB(470nm) are replaced by σabs(880nm)and σabs(470nm). These simplifications are only valid when BCFF has negligible impacts

on σabs(470nm), BCWB has negligible impacts on σabs (880nm), and OMWB has negligible impacts on σabs(470nm). I am not sure if it is the case here. The impacts of these simplifications on the uncertainty budget should be discussed. 2) σabs(λ) is considered to be constant all along the studied period at a given site. Does it mean that no seasonal variation was observed for this parameter? How good are the correlations between EC and babs(λ), at each site? 3) αFF and αWB are considered to be the same at each site. However, Fig.2 indicates for instance different values for α during morning rush-hours in summer, which could be considered as representative of αFF at each site. 4) The α variation of $\pm$0.05 used for sensitivity tests seems to me rather tiny. What would be the impacts of varying αFF by 0.1 and αWB by 0.5?

Interactive comment on Atmos. Meas. Tech. Discuss., 3, 5313, 2010.