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Atmospheric Measurement Techniques Discussions

Interactive comment on "A new algorithm for brown and black carbon identification and organic carbon detection in fine atmospheric aerosols by a multi-wavelength Aethalometer" *by* F. Esposito et al.

Anonymous Referee #2

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Review for "A new algorithm for Brown and Black Carbon identification and Organic Carbon detection in fine atmospheric aerosols by a multi-wavelength Aethalometer" by F. Esposito et al. (MS No.: amt-2012-11)

The use of AAC (absorbing Angstrom Coefficient) for obtaining information on various combustion sources from multi-wavelength Aethalomerer data is not new. Many other studies have been reported on this subject. Though the algorithm given by the authors is a good attempt and should be appreciated. Especially the separation of α during

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maintenance and normal functioning periods at the oil center is an interesting result. There is need of further observations using this algorithm. Also, authors have to mention many more references regarding work done/being done on this subject. In section 2.1, most of the formulae/equations are already known (at least up to the stage where Angstrom formula is used for AOD and on similar lines authors wish to propose formula for detection of BC/BrC). However, authors can keep them if they feel that it will be useful for beginners in this field. The main drawback of this method is that the authors seem to have derived their entire algorithm on the basis of hypothesis that when AAC (α) > 1, it signifies presence of brown carbon (BrC). However, it is not always true. It is indicated (see for example Lack & Cappa, 2012) that AAC for black carbon (BC) itself can be more than 1 depending upon BC mixture. BC cores coated with non-absorbing shells can have AAC of 1.6. Also, for AAC = 1, BC particles should be of diameter $\leq$ 10 nm or BC core has to be a fractal agglomerate containing different small spherules. BrC is considered as absorbing part of organic carbon (OC). However, there is still lot of uncertainty on their origin and chemical composition. Recent studies (Review article by Moosmuller et al 2009 and other related references therein) have suggested that optical properties of BrC may be due to water soluble organic carbon (WSOC) and humic like substances (HULIS). Apart from this, authors should use already known/adopted symbols for some of the terms like AOD, absorption coefficient, specific absorption coefficient, etc. to avoid confusion. Finally, the entire manuscript should be properly checked for errors related with language and grammar.

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5, C2572–C2573, 2012