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Interactive comment on "Recommendations for the interpretation of "black carbon" measurements" *by* A. Petzold et al.

G. Močnik

grisa.mocnik@aerosol.si

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The manuscript gives a well laid out description of the terminology and (in)consistencies in the use of the expression "Black Carbon" (BC). The need for recommendations on this topic is clear and efforts are much appreciated as the topic becomes discussed outside the tight-knit BC community.

The historical overview in the manuscript leaves out the first mention of the filter-based optical measurements. The contributions presented at the Conference on Carbonaceous Particles in the Atmosphere (Rosen 1978a, Weiss 1978) used the terminology: "measurement of absorption". The article which led to the development of the filter-based absorption photometers (Rosen 1978b) compares Raman spectra and the opti-

cal "absorption" measurement of "graphitic soot".

The first mention of the optical determination of "black carbon" came in an article which, ironically, was titled "Determination of Black Carbon by Thermal Analysis," and compared thermal methods and the optical method (Gundel 1981). It states in the first paragraph: ... The term "black carbon" is used in this paper to refer to the optically absorbing carbonaceous component of ambient and source aerosols. ...

The paper which described the method operationalized in the filter based photometer, the Aethalometer, (Hansen 1982) cited this work but did not use this operational definition of BC, it used the terminology "measurements of the absorption coefficient of an ambient aerosol". The often cited Aethalometer paper (Hansen 1984) established the use of the optical measurement of BC using the operational definition of BC from (Gundel 1981). This definition of BC was used ever since, and, at least initially, it was consistently used for the optical measurement of BC and "blackness" was measured "optically".

One of the most important recommendations of the manuscript (Petzold 2013), with which I agree emphatically, is, that when mass concentrations are reported, the MAC value needs to accompany the data. The reporting of meta-data together with the data and in a way that prevents any ambiguity needs to be built into any guidelines and tools for reporting the data. The stored measurements should be permanently linked to the associated meta-data, including the MAC. Raw data should be available to the database users, so that the calculation into the optical absorption and mass concentration using the provided MAC is possible. This transparency would facilitate the use of the recommended and consistent terminology.

The use of the term "equivalent BC" is suggested as a way to remind the users that the measured quantity is not mass concentration but optical absorption in optical measurements. As we have seen from the history of the terminology, the term BC was operationally defined: the MAC was reported as 19m2/g (including the enhancement

factor due to the filter, Gundel 1981). However, the determination of BC “mass concentration” from a measured quantity, which is not mass, is common for all measurements of BC. Using the term “equivalent” might be confusing by itself. Should we use “mass equivalent BC”? What about rBC, should it be “mass equivalent refractive BC”?

The measurement of refractive, black, graphitic... material without interference from other (carbonaceous and/or light absorbing) aerosols is a challenge which is complicated by the terminology. It was recognized early on (Hansen 1982) that what we now call BC featured $1/\lambda$ wavelength dependence. This is suggested also in this manuscript (Petzold 2013) and I would urge the authors to go one step further and change the empirical definition of BC, determined by the optical methods; use the Angstrom exponent α as the quantitative criterion; and define "blackness" as the aerosol property identical to α=1. This avoids the limitations of current terminology.

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