

# ***Interactive comment on “Two-wavelength thermo-optical determination of Light Absorbing Carbon in atmospheric aerosols” by Dario Massabò et al.***

## **Anonymous Referee #1**

Received and published: 19 March 2019

The paper describes the application of a modified Sunset Lab Inc. EC/OC analyzer with a two-wavelength set-up for analysis of ambient aerosol samples. It strongly relates to earlier work of the author which is described detailed in previous publications, nevertheless it extends to additional findings. The results derived from the comparison of two temperature protocols, NIOSH5040 and EUSAAR2, for the 405 nm wavelength as well as the reported MAC values are a valuable addition to the literature. However, the paper lacks in structure and suffers in use of proper scientific English which limits its potential. It is recommended that the text is reviewed with focus on syntax and vocabulary. Particular attention should be given in the first paragraph of the abstract and the first two paragraphs of the introduction. Further:

Sentence starting in line 115: “The hypothesis under such choice...” should be rephrased.

The terms “real samples”, “real-world samples” and “real-world aerosol samples” are used throughout the text. The use of one term is recommended.

“ $\lambda$ =”, “@ $\lambda$ ” and “@ $\lambda$ =” are used to state wavelengths. Please consider using one form ( $\lambda$ =) for consistency.

Sentence starting in line 59 should be revised. “Standarized” should be replaced by standardized. Since 2017, when EN16909 was published, there is uniformity in OC/EC analysis methodology, at least for EU.

Paragraph starting in line 157: Any specific reason why this subset was analyzed with EUSAAR2 only?

Paragraph starting in line 165: PM10 samples are known to add complexity in OC/EC analysis due to minerals, refractory material and oxides present in coarse fraction. Did you consider sampling/analysis of PM2.5 samples and have you noticed any of the above interferences?

Line 174: It sounds like two different subsets were created, one for analysis with EUSAAR2 and one for NIOSH5040. If that is the case, why was that choice made instead of all samples being analyzed with both protocols?

Line 193: It is not clear to me why the discrepancy between EUSAAR2 and NIOSH5040 is mainly driven by charring. In a sense more pyrolytic carbon would result in a later split point and less EC reported. Further, since the blue laser diode resulted in later split points for EUSAAR2, wouldn't that rate it as less sensitive to charring instead of more, as mentioned in the text?

Is it possible to include a figure and/or representative thermograms that illustrate the consistent 40% discrepancy between EUSAAR2 and NIOSH5040?

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Line 267 and elsewhere in the text: The term “Sunset set-ups” could be altered to a more descriptive term.

Line 289: What would be the value of  $1\sigma$ ? It seems that the difference between the two MAC values reported is substantially greater than the reported uncertainty.

Line 316: “Brow carbon”

Line 338: This sentence could be rephrased for easier comprehension.

Line 348: Same stands for this sentence.

Figure 4: It is not clear which relationship applies to which trendline.

Figure 6: It seems that 2 separate subgroups are formed, one equal and above the trendline and one below the trendline. Are those related to the specific sampling strategy or to any other parameter?

Please also note the supplement to this comment:

<https://www.atmos-meas-tech-discuss.net/amt-2019-5/amt-2019-5-RC3-supplement.pdf>

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Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2019-5, 2019.

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