

Interactive comment on “Inter-comparison of NIOSH and IMPROVE protocols for OC and EC determination: Implications for inter-protocol data conversion” by Cheng Wu et al.

Anonymous Referee #2

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The paper describes an inter-comparison of NIOSH and IMPROVE temperature protocols and potentials on data conversion between the two. Even though the topic has been the center of several other works it is certainly an important addition when considering the quantity of samples included and the further investigation of the applicability of conversion equations, including other parameters like biomass burning tracers, SOC, potassium and ferric oxides. Overall an orderly and thorough work that deepens in the comparability of the two protocols; therefore, I suggest the acceptance of the paper for publication after dealing with the following comments and remarks:

2.2 Sample analysis: Temperature offsets of up to 100 °C have been observed to be present and vary per instrument, protocol and temperature step. Was the procedure

C1

of temperature offsets' correction considered in this study? Were there one or several ovens and heating coils installed? Oven soiling and aging has been also found to have an influence on results. Related studies for consideration:

Chiappini et al.: Clues for a standardized thermal-optical protocol for the assessment of organic and elemental carbon within ambient air particulate matter, *Atmos. Meas. Tech.*, 7, 1649–1661, doi:10.5194/amt-7-1649-2014, 2014.

Panteliadis et al.: ECOC comparison exercise with identical thermal protocols after temperature offset correction – instrument diagnostics by in-depth evaluation of operational parameters, *Atmos. Meas. Tech.*, 8, 779–792, doi:10.5194/amt-8-779-2015, 2015.

Pavlovic, J., Kinsey, J. S., and Hays, M. D.: The influence of temperature calibration on the OC–EC results from a dual-optics thermal carbon analyzer, *Atmos. Meas. Tech.*, 7, 2829–2838, doi:10.5194/amt-7-2829-2014, 2014.

3.2 NIOSH and IMPROVE comparison: OC4 ramps up from 615 °C to 870 °C. This means that the fraction evolving from 550 °C to 615 °C is not included in the equation. Doesn't this introduce an error to the equation 1?

Further, in line 173, the term “laser effect” is introduced, which refers directly to the actual instrument part/laser unit and not to the optical method selected which is implied here. Please consider replacing with “optical method effect”, at this point and also further down the text. I am not convinced though that the thermal and optical effects are independent and can be separated. Isn't the PC that is responsible for the so called “laser effect” generated thermally, earlier, during the inert phase?

Lines 190–200: This paragraph seems a bit difficult for the reader to follow. Could you please rephrase?

Finally, from this chapter and Figure 3 I assume that PC-IMP is higher from PC-NSH by ~18%. Could you discuss a bit more why is this observed?

C2

Line 134: Your criteria seem to be very loose, especially when considering the distribution of results on Figure S2b. What is the reasoning behind this? Could these criteria be stricter?

3.3.1: I would prefer M2-1 reconstruction method included in the main text. According to my opinion it points out the importance of monitoring other relevant factors like Fe and K+ next to OCEC analysis and further shows a good fitting, certainly adding value to the paper.

Line 53: This sentence could be improved. Maybe continuous monitoring of laser transmittance?

Line 56: What is meant by “sampling” networks? Monitoring?

Line 101: Were the filters collected every 24 hours manually or was there a sequential sampler installed? Not clear.

Table1: The “Overall” column would be better as the last column. Does overall refer to average? Please indicate also which measurements are made with NIOSH and which with Improve in the table. Further, some measurements were performed with a different analyzer. Maybe worthwhile inserting a footnote with this information?

Correct NISOH to NIOSH. Couple occasions in the text.

Line 52: Pure He reads better than He-only

Line 58: Protocols also differ in duration.

Line 102: Remove “.”

Line 144: $\mu\text{gm-3}$ to $\mu\text{g m-3}$

Line 257: The abbreviation RHS is not introduced.

Line 348: Both to both

Line 358: $2.66\mu\text{g}$ to $2.66 \mu\text{g}$

C3

Table 2: Some figures are in bold. Is there a reason for this?

Figure 1: a) The OC/EC split line in the legend is vertical while the rest horizontal b) The line of the OC/EC split is not included in the legend

Table S3: Does “Measured OC and EC” mean OC/EC?

Figure S4: Is PC included in one of the fractions mentioned here?

The supplemental material seems too extensive. Would you consider removing some figures? eg S16 to S20.

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2016-116, 2016.

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