

Responses to the reviewers:

“Elemental analysis of Oxygenated Organic Coating on Black Carbon Particles using a Soot-Particle Aerosol Mass Spectrometer” by Mutian Ma et al.

Reviewer #3

The manuscript "Elemental analysis of Oxygenated Organic Coating on Black Carbon Particles using a Soot-Particle Aerosol Mass Spectrometer" by Mutian Ma et al. presents fundamental work on the use of electron-ionization mass spectra for estimates of elemental analysis (EA) organic compounds. The manuscript focusses on the differences between the laser vaporizer in the SP-AMS and the thermal vaporizer in the predecessor AMS. The main goal of the manuscript is to present a revised parameterization for EA estimation. The work is excellent, and the presentation is outstandingly clear. I have a few short comments on the statistical presentation of the results, which the authors should be able to address easily. I recommend publication after these minor comments.

Response: We thank for the constructive comments from the reviewer. Our responses to specific comments are shown in blue color below:

Specific comments:

1. First, the major result of this manuscript is the I-A, SP parameterization from laboratory work. The graph which truly illustrates this result is Figure S3. Figure 4 shows the "old" method. I recommend that the authors combine Figures 4 and S3 into one 6 panel figure.

Response: As suggested by the reviewer, previous Figure S3 has been moved to the manuscript and combined with Figure 4.

2. Second, the abstract discusses the "relative error of O:C" for the compounds measured in the lab. The manuscript explains that this is the "average relative error". I am not entirely clear how the average was calculated, but I believe this is the Root Mean Squared Error (RMSE) or Mean Absolute Error (MAE). The authors should specify this precisely.

The RMSE or MAE is a measure of the bias of the calibration. The authors should also report the precision of the calibration. An excellent example of this is found in Reggente, Dillner, and Takahama (Atmos Meas Tech 2016, <https://doi.org/10.5194/amt-9-441-2016>), but the authors may prefer some other formulation. My first comment also addresses the importance of precision, because the scatter in Figures S3 and 4 shows this precision.

Response: We use the average value of percentage error in the abstract and main text to show not only the magnitude of the discrepancy and also the underestimation caused by applying I-A method for data obtained from the LV scheme. The RMSE and MAE were calculated and has been reported in Table S5 in the revised supplementary information. The main text has been modified to connect our discussion from revised Figure 4 to Table S5.

Section 3.5, page 9, lines 13-15: “As shown in Figure 4 panel d-f, the H:C, O:C and OS_C values calculated by the I-A_{sp} method are better aligned with the 1:1 line compared to those determined by the I-A method (Figure 4) with smaller root mean squared error (RMSE) reported in Table S5.”

Table S5. Root mean squared error (RMSE) and mean absolute error (MAE) of I-A and I-A_{sp} method

	I-A H:C	I-A O:C	I-A _{sp} H:C	I-A _{sp} O:C
RMSE	0.45	0.3	0.37	0.21
MAE	0.38	0.23	0.31	0.14