Review Comments on AMT-2019-376

General Comments

The manuscript presented a new system for continuous monitoring of carbon fractions in ambient particle samples and conducted comparisons between the online method with the offline filter based thermo-optical OC-EC method. The advantages of the new system, i.e. easy-to-deploy and low maintenance, are convincing while a few details regarding data treatment and analytical specifications need to be elaborated before the manuscript can be considered for publication.

Specific Comments

Introduction:

The intro part mainly discussed the definitions of different carbon fractions and various protocols for measuring the carbon fractions. However, some of the content is repetitive (e.g. it was discussed in Page 2 Line 26 to Page 3 Line 2 that a few factors will influence the OC-EC split while similar points were mentioned again in Page 3 Lines 9–27). The authors also listed out three protocols that have been widely used in different regions of the world (Page 2 Lines 16–24). Since in the following sections the online data were compared with the offline data obtained from the EUSAAR2 protocol, readers might expect to see more discussions on the specific differences among the protocols (EUSAAR2 vs. IMPROVE_A, EUSAAR2 vs. NIOSH).

Section 2.2:

How is the performance of external calibration (using sucrose or KHP or other chemicals) by TCA08? What is the maximum carbon concentration tested?

Section 3.3:

What is the "carbon calibration factor"? How is it derived?

What's the loading effect compensation algorithm used for treating AE33 data in this study? Will different algorithms introduce uncertainties?

Section 3.4:

It can be seen from this work and from previous literature data (Table 3) that the relationship between BC and EC is location dependent. If the aerosol composition at a certain location has a very clear temporal variation pattern, the parameter *b* could be sensitive to the sampling time period as well. Since the PM monitoring networks usually adopt the filter-based sampling approach followed by offline laboratory analysis and the historical dataset was very likely obtained from offline measurement, do the authors suggest that every time the online TC-BC system is deployed to one sampling location, the online-offline comparison needs to be conducted to derive the *b* value so that the measured data can be compared to other dataset?