

Thanks for the great suggestions. In the revised paper, we have cited the original aethalometer and PSAP papers (Hansen et al., 1984; Bond et al., 1999) and provided a better description of the optical monitoring system as well as changes between the original and upgraded instruments. As shown in the Response to Reviewer #1, the principle and geometry of reflectance measurement remains the same, i.e., laser beam is directed to the sample through a coaxial optical fiber and a quartz light pipe (perpendicular and ~ 2 mm to the sample) by which the reflected light is acquired. We have explained in the response to the Reviewer #1's comments that the instrumental upgrade likely influences EC measurement more than τ_R measurement.

We also agree that quantifying the highest or lowest EC samples is particularly challenging. The issues the Reviewer pointed out, i.e., signal saturation and uncertainty, however, are just part of the problem. We have added discussion regarding the uncertainty on OC-EC split in Lines 219-222 of the revised manuscript:

(Line 219-222) "With an improved signal-to-noise ratio of the reflectance measurement, the upgraded instruments possibly trigger the split (crossover) later than the original instruments, leading to lower EC fractions. τ_R quantification is little influenced by the noise, as both R and R_0 are averaged over 15 seconds before and after the thermal analysis."

Other issues include potentially more charring in the upgraded instrument (discussed in Lines 209–212 of this manuscript):

(Line 209-212) "The POC fraction generally increased for samples analyzed since the beginning of 2005 due to higher purity of the inert He atmosphere and more rigorous quality control of He purity (Chow et al., 2007, 2011). Even with the reflectance correction, some POC can be misclassified as EC, thereby increasing the EC fraction."

References

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