

Anonymous Referee #2

I think the paper presents highly valuable results and the findings are definitely worth publication. The author did a reasonable job addressing the reviewers' comments and the paper is more readable now. I still think the paper would benefit from some editorial work to improve readability and correct grammar issues; in particular, in the newly added sentences.

Response: Thanks for the reviewer's constructive comments. The comments are significantly helpful to improve readability of our manuscript, and make the paper more solid. The following presents our point-to-point responses as well as the revision for the manuscript.

Just a few examples (but many more are present):

1. In the abstract: "more large BC particle..." do the authors mean "BC particles with larger coating" or "a larger number of BC coated particles" or something else? From the paper it seems quite plausible that they mean "BC particles with larger coating", but as it is the sentence can be confusing for the reader as they start reading through the paper. A very similar issue with the sentence "if there are plenty of small coated BC particles...", and "...for smaller coated volume fraction of BC"; does "smaller" refer to the fraction of BC or for BC particles that are smaller in size? Again the interpretation becomes evident after reading the rest of the paper but more clarity since the beginning would help readability.

Response: We have modified it accordingly (Page 1, lines 16, 21 and 27).

2. "...the absorbing organics, named brown carbon (BrC), absorbs radiation" maybe should be "the absorbing organics... absorb"?

Response: We have modified it accordingly (Page 2, line 6).

3. "Therefore, in ambient measurements, large AAE is considered to be that aerosols originate from dust or biofuel/biomass burning, while small AAE near 1.0 is understood to be that aerosols are BC-rich particles due to the burning of fossil fuel", maybe "Therefore, in ambient measurements, large AAE is considered to indicate that aerosols originate from dust or biofuel/biomass burning, while small AAE near 1.0 is understood to indicate that aerosols are BC-rich particles due to the burning of fossil fuel"

Response: We have modified it accordingly (Page 2, lines 16-17).

4. "It is observed that BC particles can externally attached to, partially coated in, or fully encapsulated in coatings [China et al., 2013, 2015]. This study considers BC aggregate core with a spherical coating, following the coated BC models built by Zhang et al. [2018], and the sketch maps of three typical coated BC structures considered (i.e., externally attached, partially coated and fully coated) are portrayed in Figure 1." maybe reword as "It is observed that BC particles can be externally attached to, partially coated in, or fully encapsulated by coatings [China et al., 2013, 2015]. This study considers a BC aggregate core with a spherical coating, following the coated BC models built by Zhang et al. [2018]. The sketch maps of three typical coated BC structures considered here (i.e., externally attached, partially coated, and fully coated) are portrayed in Figure 1."

Response: We have modified it accordingly (Page 3, lines 23-25).

5. "The AAE of coated BC aggregates is also slightly sensitive to BC Df, and the sensitivity shows weaker as Dp/Dc or F become larger." maybe could be rephrased as: "The AAE of coated BC aggregates is also slightly sensitive to the Df of BC, and the sensitivity becomes weaker as Dp/Dc or F increase."

Response: We have modified it accordingly (Page 7, line 3).

6. "This is probably due to that the absorption of BC coated by BrC with core-shell Mie model show slower increase with decreased wavelength than that of coated BC with realistic particle geometry." maybe could be rephrased as: "This is probably because the absorption of BC coated by BrC calculated from the core-shell Mie model shows a slower increase with decreased wavelength than that calculated using realistic particle geometry."

Response: We have modified it accordingly (Page 7, lines 8-10).

7. The sentence "coating. It should be noticed that no one has ever definitively separated BrC from organic carbon, and to a certain extent, the concept of f here may be treated as that the cases of BrC with imaginary parts of refractive indices less than those of Kirchstetter et al. [2004] are considered due to a range of BrC refractive indices being provided [Schuster et al., 2016]." is very confusing, please consider rewording it and maybe breaking it down into two sentences.

Response: We have broken it down into two sentences (Page 8, lines 10-13).

8. Line 27, page 8: "small coated BC" again does this indicate small BC particles that are coated or BC particles that have a thin (small) coating?

Response: Here "small" indicates small AAE, and we have modified it to make it clear (Page 8, line 27).

9. "The correlation coefficient for parameterizing with three variables (i.e., f , ρ_c , and F) is mildly smaller than that with one variable (i.e., each of f , ρ_c , and F), and". I am confused by this sentence, I would guess that the more parameters one uses the higher the correlation coefficient should be, so "is mildly smaller" seems weird... but maybe I am misunderstanding the sentence here. I would consider revising this sentence to make it clearer.

Response: We have modified it accordingly (Page 10, line 17).

10. Line 10 page 11: "more large coated BC" see previous comments on these kinds of expressions.

Response: We have modified it accordingly (Page 11, line 10).