Authors have brought to the attention of the scientific community the potential "flaw" in the current retrieval process for the Single Soot Photometers (SP2). They compared the current method, which is based on the spherical Mie core-shell assumption, with the closed-cell and coated aggregate models. It has been nicely illustrated by the authors what the differences would be in the D_p/D_c, C_{sca}, MAC, MSC, and RF if a closed-cell and coated aggregate model is used. In light of the increasing use of SP2 in atmospheric sciences, this paper is important, well-written and relevant for publication in this journal. It is a well-constructed study, the methodology is clearly explained, and reasonable conclusions are drawn. After addressing some comments mainly regarding the results and discussion, my recommendation is for publication.

1. The authors mostly provide the message that: “The measurement errors of mixing state have larger effect on the estimation accuracy of radiative forcing for heavily coated BC particles than that for thinly coated BC particles at both 1064 and 532 nm wavelengths.”

   Generally, the authors report that discrepancies are primarily concentrated in heavily coated particles (for all parameters D_p/D_c, C_{sca}, MAC, MSC, and RF). In my opinion, it is relevant to both thinly coated particles and heavily coated particles. When a fractal morphology is used to model BC in thinly coated particles (uniform coating around a BC fractal - closed cell model), it underestimates D_p/D_c and C_{sca} when compared to current Mie theory-based retrievals. In contrast, for heavily coated particles (where the BC fractal is completely enclosed in a spherical coating), the D_p/D_c and C_{sca} are overestimated compared to the current Mie theory-based estimates. In other words, it may be necessary to change the retrieval process depending on the type of mixture or age of the aerosols the SP2 measures. A major message from this research is that the community should adapt the current Mie core-shell retrieval according to the ageing stage of BC being measured.
2. What I found lacking was a discussion of comparisons between experimental and field applications. In light of the findings of this study, the next step would be to validate the D_p/D_c derived from the actual SP2 measurements using the spherical Mie core-shell assumption and the closed-cell and coated aggregate models. There should also be a comparison between this measurement and maybe other chemical measurements that report the BC mass/volume fraction, such as filter measurements. In order for the findings of this study to be fully validated, the findings of a field or laboratory study are necessary (outlook).

3. As a follow-up to comment 2, the authors should mention previous experimental studies that have demonstrated how important it is to consider BC as a fractal aggregate. Until now, no one has presented any information regarding SP2.

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4. Figures 3, 4, show the value of Dp,v/Dc,v, which is the standard constant in each subfigure. It would be helpful to include the value of volume fraction in brackets in order to make it more relevant to those who do not use SP2, as well.

5. In Figure 5, it would be helpful to be able to see the slope in each sub-plot. By doing so, one would be able to determine how high or low the models are in relation to one another in terms of numbers.

6. There is a higher error in the calculation of the radiative forcing for thickly coated particles when Dp,v/Dc,v is higher. It would be interesting to see how the forcing values change for cases with Dp,v/Dc,v close to 1, i.e., thinly coated particles (as I discussed in the first comment).

7. Last but not least, a "beta" version of the retrieval code based on the closed-shell or coated aggregate model would be helpful to the community. It is possible for the authors to share the codes that they used in this study. However, this will only be a test version that would be developed in the future.