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Supplement of

Effects of brown coatings on the absorption enhancement of black carbon: a numerical investigation

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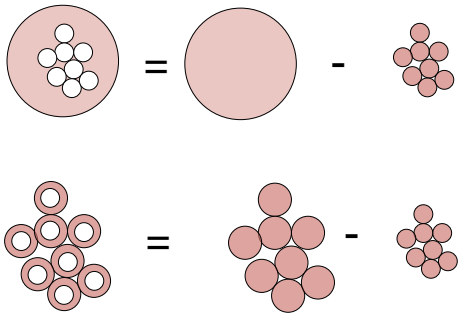

Figure S1. Calculation of the absorption of brown carbon (BrC) shell.

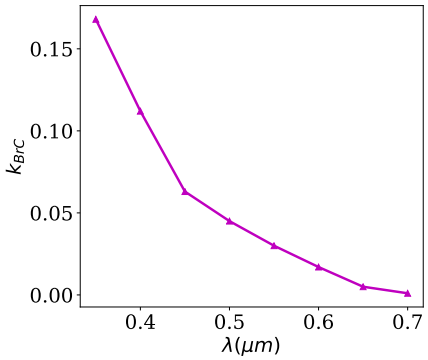

Figure S2. Imaginary part of the refractive index of BrC based on the study of Kirchstetter et al. (2004).

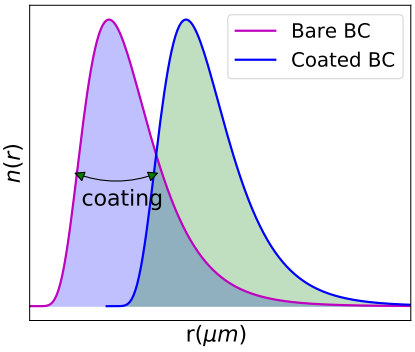

Figure S3. Size distribution of bare and coated BC.

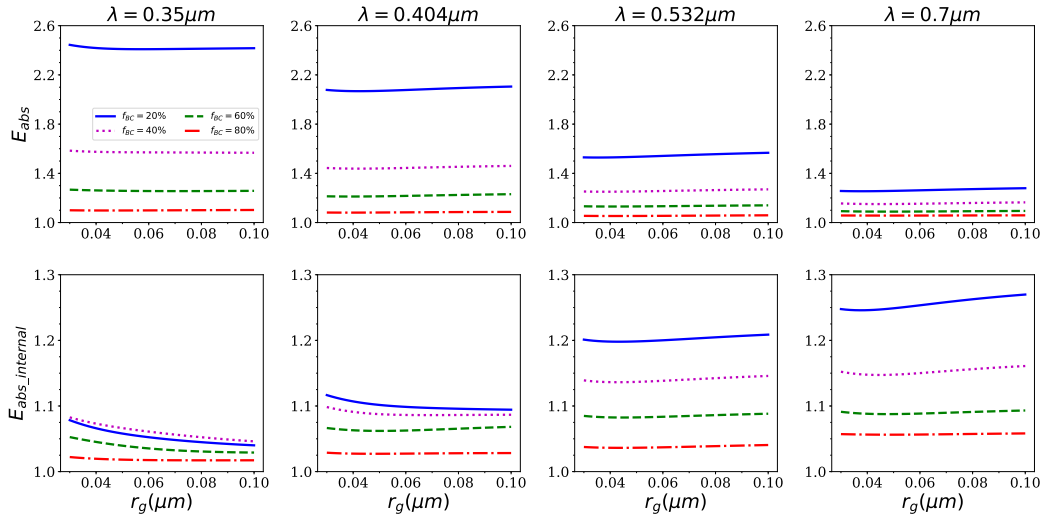

Figure S4. E_{abs} and $E_{abs\_internal}$ of thickly-coated BC with BrC varying with r_g at different f_{BC} ($D_f = 2.6, \sigma_g = 1.5$).

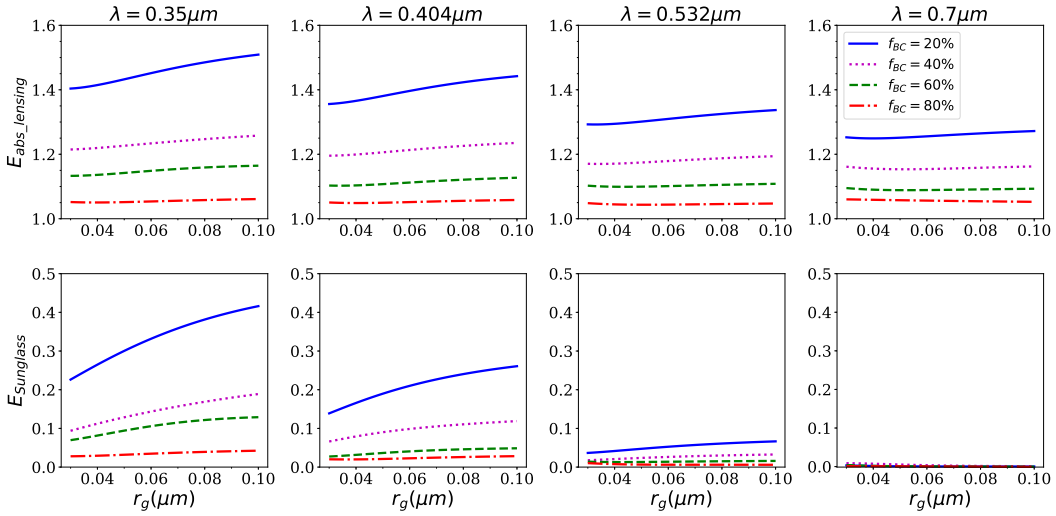

Figure S5. $E_{Sunglass}$ and $E_{abs\_lensing}$ of thickly-coated BC with BrC varying with r_g at different f_{BC} ($D_f = 2.6, \sigma_g = 1.5$).

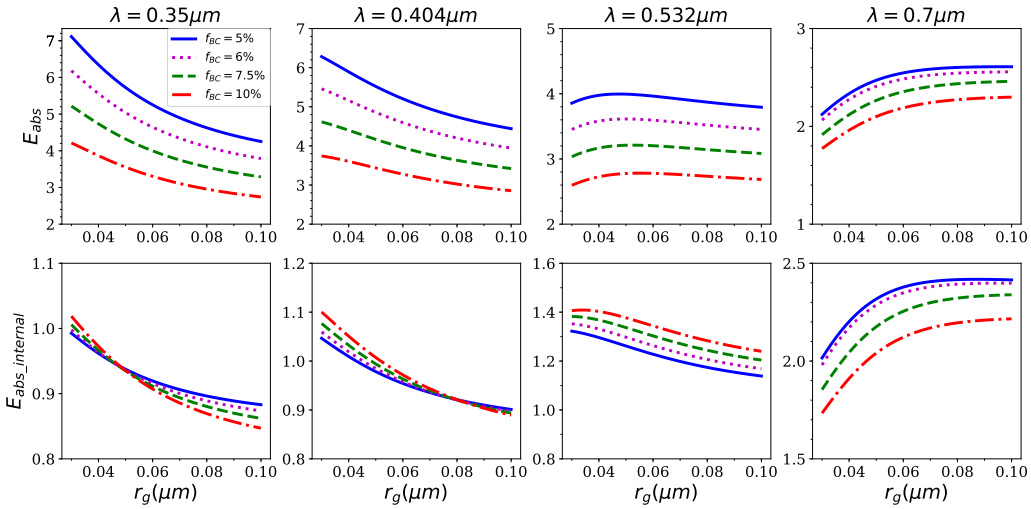

Figure S6. E_{abs} and $E_{abs\_internal}$ of thickly-coated BC with BrC varying with r_g at different f_{BC} ($D_f = 2.6, \sigma_g = 1.5$).

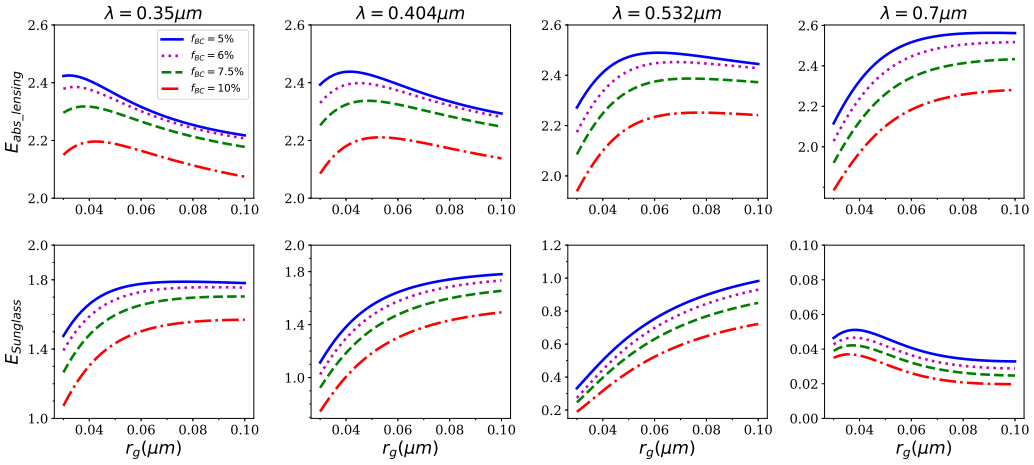

Figure S7. $E_{Sunglass}$ and $E_{abs\_lensing}$ of thickly-coated BC with BrC varying with r_g at different f_{BC} ($D_f = 2.6, \sigma_g = 1.5$).

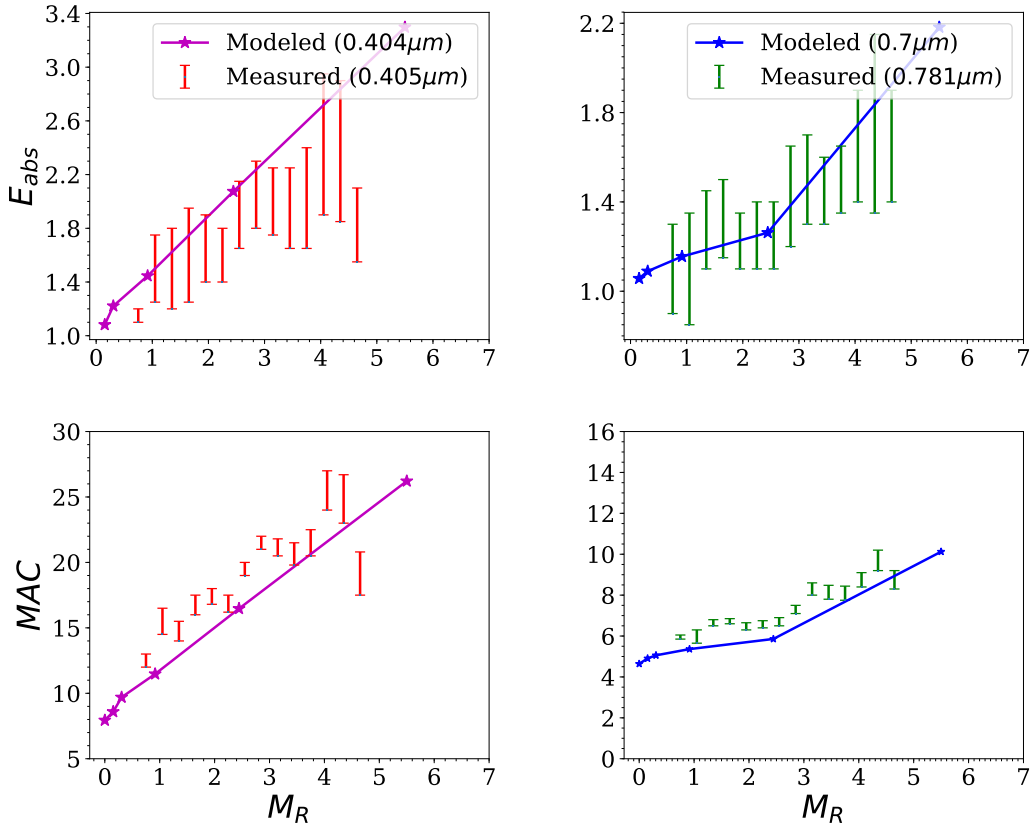

Figure S8. E_{abs} and $E_{abs\_lensing}$ of thinly-coated BC with BrC coatings varying with M_R (BC is assumed to be thinly-coated when M_R<3, while is assumed to be thickly-coated when M_R>3. $D_f = 2.2$ is assumed for thinly coated BC. $r_g = 0.06\mu m, \sigma_g = 1.5$, $\rho_{BC} = 1.8\ g/cm^3$ (the measured E_{abs} and MAC are derived from Figure 1 and supplementary Figure 2 of Liu et al. (2015)).

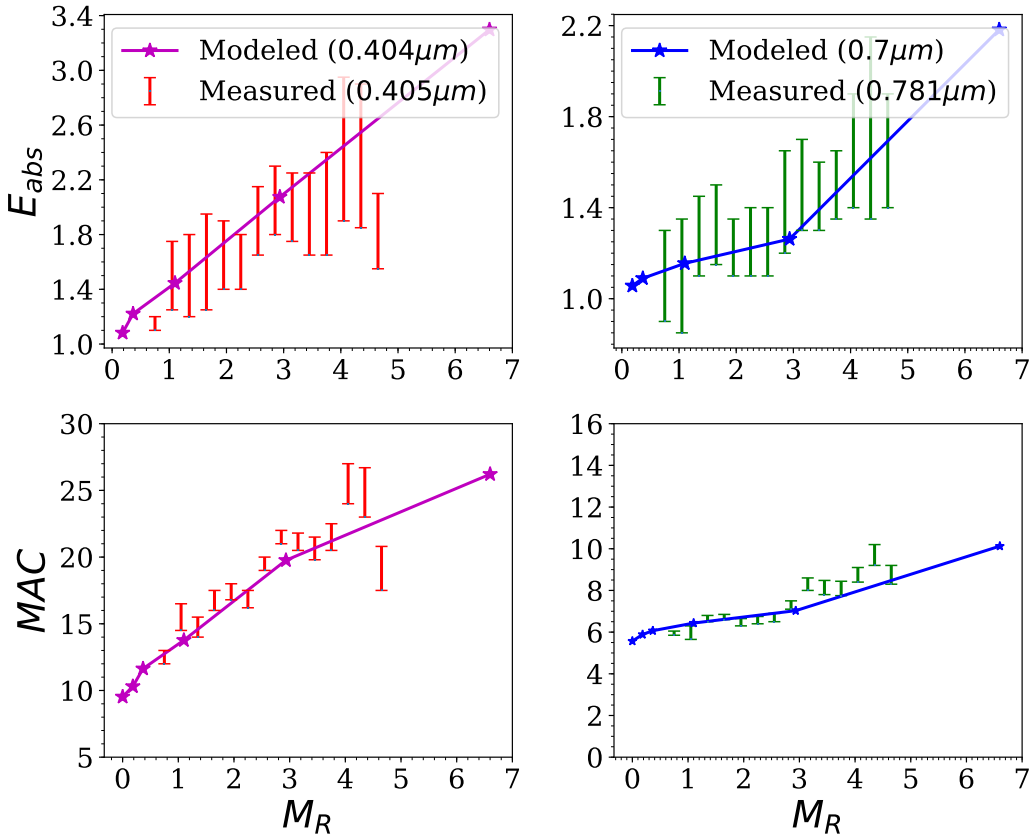

Figure S9. Similar as Figure S8, but for $\rho_{BC} = 1.5\ g/cm^3$(the measured E_{abs} and MAC are derived from Figure 1 and supplementary Figure 2 of Liu et al. (2015)).

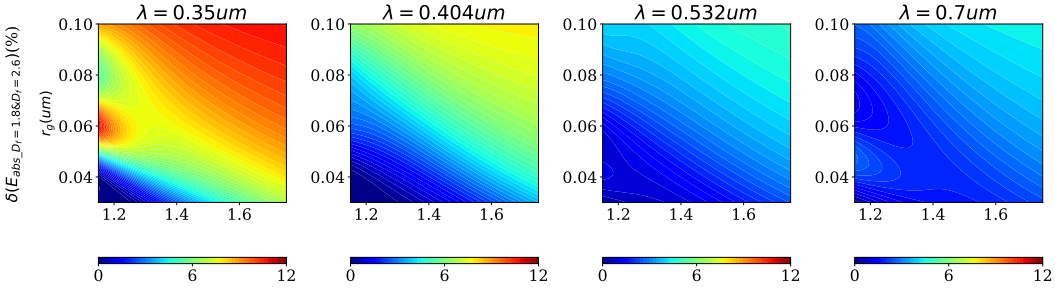

Figure S10. The relative deviations of absorption properties between $D_f = 1.8$ and $D_f = 2.6$ for thinly-coated BC with non-absorbing coating ($f_{BC} = 20\%$).

References

Kirchstetter, T. W., Novakov, T., and Hobbs, P. V.: Evidence that the spectral dependence of light absorption by aerosols is affected by organic carbon, Journal of Geophysical Research-Atmospheres, 109, <GotoISI>://WOS:000225190500010, 2004.

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