

Interactive comment on “Absorption closure in highly aged biomass burning smoke” by Jonathan W. Taylor et al.

Anonymous Referee #1

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General Comments:

Taylor et al. present in situ airborne measurements of BC mass, microphysical BC properties, and multi-wavelength absorption in aged smoke sampled off the coast of central Africa. The dataset analyses in terms of retrieving the effective MAC and compare several models of the absorption coating enhancement. This work is an important to constraining aerosol optical properties and evaluating parameterization that may be used to more accurately model the aerosol radiative effect, specifically black carbon. This work is high quality and appropriate for ACP and should be published with minor revisions.

Specific comments:

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Although technically correct, is it necessary evaluate the absorption enhancement in a quasi-single particle manner? If one assumed a log normal BC SD and an average size independent coating thickness would calculation of Eabs be significantly different?

Please consider moving section S5 and figure S5 to the main text as it is an important piece of the main conclusions of this manuscript.

Technical comments:

Page 5 line 33: Please add a reference describing the characterization of the rose-mount inlet. Page 6 line 19: PCASP, for specific commercial instrumentation please state the model number and manufacturer Page 11 line 5: Please explain why only level and straight legs were used? Was the data quality better? Page 13 line 6: The last clause of this sentence is confusing and outplace. Please remove or edit it. Page 15 line 25: This sentence is too broad. In the aged samples analyzed here, the BrC 'signal' is lower than the noise/uncertainty in the coating enhancement. However, in fresh smoke with the absorption dominated by BrC, it may be possible to extract a meaningful MAC of the OA. Page S5 line 1: Is this the same level flight leg used in the main text Fig 5? If so, please note it. Page S5, line 3: typo, 'correct' Page S11, line 20: References to the Dc distribution and Figure 5a should be update to reference figures in the manuscript. Figure 1: This figure is adequate but could be used to tell more of the story. Consider adding the approximate fire locations and arrows indicating the transport direction and time. Figure 5: Please consider added a mirrored axis on top with the spherical equ. diameter. Are other legs similar to this example? Is MR size dependent for all of the analyzed legs. Please add a sentence to the text describing the variability of this plot for the whole dataset.

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