Atmos. Chem. Phys. Discuss., 10, C8050–C8052, 2010
www.atmos-chem-phys-discuss.net/10/C8050/2010/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Optical-chemical relationships for carbonaceous aerosols observed at Jeju Island, Korea with a 3-laser photoacoustic spectrometer" *by* B. A. Flowers et al.

B. A. Flowers et al.

bflowers@lanl.gov

Received and published: 28 September 2010

[1] The episodic OC/sulfate ratios are listed as the prime metrics for composition in this study. These are for individual episodes where the source of the aerosol is NOT constant across the campaign, hence for the optical properties, each mass/composition must be considered individually. We state the change in OC/sulfate is based on changes in sulfate explicitly in the text and do NOT conclude or imply that changes in OC are the sole causes of changing ω405. We agree with the referee that single scatter albedo depends on BOTH βabs and βsca, which is why the OC/sulfate ratio, a composition metric describing both absorbing and scattering components, is an appro-

priate metric for connecting optical properties with chemical composition.

[2,3] We appreciate both reviewers comments on properly introducing brown carbon and mass absorption cross sections. We have re-written the introduction of the manuscript to further introduce brown carbon and its absorption in the context of this paper. We have lengthened our discussion of our definition and calculation procedure for MACs from BC and BrC. We do note in the references cited (Andreae et al. 2006) that no clear consensus exists defining black or brown carbon. We do address the authors comment that 'not all OC mass is BrC' by estimating the MAC for BC, then determining a so-called coating factor, derived at 781 nm, but applied at all 3 wavelengths, which accounts for absorbing material not considered OC. The re-written version of the text clearly defines MACBrC as "additional absorption than has been accounted for by coating of elemental carbon cores".

Detailed comments from Anonymous Reviewer #2 - We will examine typeset versions of the manuscript more closely in the future to eliminate this concern. - We have updated the Methods section of the manuscript with a more detailed description of how the chemical composition measurements were made. - Northeast is indeed the correct description. The back trajectories in this episode were circuitous and these are included in the supplementary information. - This sentence has been clarified and simplified. - The description of the Mie code has been amplified and made clearer in the new version of the manuscript. - The optical properties at 532 and 781 nm are stated and amply discussed in the text. They do not appear in Figure 3 of the new version of the manuscript, and they never appeared in Figure 2 of the original or new version of the manuscript. The values shown in Figure 2 are listed in Table 1. - This is indeed a typo, for which we are grateful to the reviewer for noticing. The correct value is 0.07 instead of 0.13 and the appropriate change has been made to the Table. - The 3-laser photoacoustic spectrometer data is new and this is the first PASS-3 data reported from a field campaign. - Episode 8 is a fire-impacted aerosol transport episode. This paper puts the optical properties of carbonaceous aerosol (from several complex

sources, including fires) into context with their chemical composition. Especially when read along side Chakrabarty et. al.'s paper in the special issue, the optical properties reported here contribute to the overall understanding of biomass burning aerosols in the atmosphere. Due to significant re-writing of the manuscript, we have changed the title to a more inclusive statement. - The paper by Chan et. al. suggested by the reviewer shows results from filter-based optical property measurements and limited discussion on wavelength dependence. We feel it is outside the scope of this paper to compare ambient and filter-based aerosol absorption measurements. We do note, however, that comparisons of this kind are appropriate for a separate analysis and manuscripts.

Please also note the supplement to this comment:
http://www.atmos-chem-phys-discuss.net/10/C8050/2010/acpd-10-C8050-2010-supplement.pdf

---

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 9369, 2010.