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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Aerosol vertical distribution and optical properties over M'Bour (16.96° W; 14.39° N), Senegal from 2006 to 2008" *by* J.-F. Léon et al.

Anonymous Referee #1

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General: The paper contains interesting, original observations with sun photometer and lidar at a tropical western African site in the outflow area of biomass burning smoke and desert dust. Such observations are of importance to support climate modelling efforts, but are sparse. The paper is thus appropriate for ACP.

Minor revisions are required.

Details:

Abstract: line 4: world (not word)

Page 1, right column, lower part: winter transport is also observed by Tesche et al.

(JGR, 2009) during the SAMUM campaign.

Page 2, left column, lower part: Heese and Wiegner (JGR 2008) performed Raman lidar observations during AMMA (lidar ratio observations). Should be mentioned, because lidar ratio estimates are required in the lidar data inversion presented here.

Page 2, right column, and page 3: Lidar ratio is discussed. Again, the results of Heese and Wiegner should be included in the discussion here.

Page 3, text following Eq.(4): the method applied is the one of Fernald (Appl. Opt. 1984). The original Klett method (1981) ignores Rayleigh scattering, i.e., assumes particle scattering only.

Page 3, right column: iterative procedure. . .. .! Please explain in detail!

Page 3, right column: In this context: It is dangerous to compare the optical depth derived from the lidar profile and the optical depth obtained from sun photometry. How did you overcome the overlap problem? How large is the remaining uncertainty of the overlap correction?

Page 4, left column: R-min is at 225 m? ..and the overlap is completed at around 3 km, as I expect for a CIMEL MPL lidar. So, please quantify the uncertainty in the results introduced by the overlap correction uncertainty. The overlap configuration can change dramatically as a function of ambient temperature. . ..

Page 5, left column: Please check SAMUM special issue (Tellus B, 2009) for SSA values, too.

Page 6, left column: There is a paper of Mueller et al. (JGR, 2007) on lidar ratios, better to cite that. Check also Tesche et al. (JGR, 2009) for recent lidar ratio observations in smoke/dust plumes during SAMUM.

Page 6, Figure 7: When lidar ratio is below 50sr (or even 40sr) then there is a large maritime impact? Please explain!

Page 7, left column, section 4.1.1: Keeping in mind that the overlap is complete at about 3 km, I would not trust extinction values below 1.5km height.

Page 7, right column, sections 4.1.4, 4.2: lidar ratio can vary strongly from layer to layer (in the vertical)

Page 8, Figure 9: x-axis and y-axis text is too small, other text (months) too, decrease empty space between plots, please.

Page 9, left column: regarding lidar ratio profiles, aerosol types, layer heights, please provide more context to AMMA and SAMUM literature (Tellus, JGR), and may be SHADE results, and other observation over the Atlantic (Berthier et al., JGR).

Page 9, right column: again, world (instead of word).

Page 10, Figure 11: again, x-axis and y-axis text is too small, other text (SSA. . .) too, decrease empty space between plots, please.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 16295, 2009.