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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Physical properties and concentration of aerosol particles over the Amazon tropical forest during background and biomass burning conditions" *by* P. Guyon et al.

P. Guyon et al.

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Reply to Anonymous referee 2

http://www.cosis.net/members/journals/df/article.php?a$_i d = 148$

General comment: It is correct that the aim of the present study was not only to publish and discuss in one article the aerosol measurements performed during both the wet and the dry seasons in Brazil, but also to offer a platform for discussion on some of the most commonly measured, assumed, and/or derived aerosol physical parameters. As noticed by the referee, this study also proposes the only correction (semi-empirical) available for the widely-used Radiance Research nephelometer.

Reply to specific comments:

Overall I have few specific comments. I would like to see an analysis of the MOUDI data from this campaign especially with regard to calculated refractive indices, mass scattering and absorption efficiencies. There is a reference for a paper on refractive indices. Would it be possible to add a section on mass scattering and absorption efficiencies or is this to be published in another paper?

Response: - The manuscript on refractive indices is now in press in Journal of Aerosol Science, and available online: Guyon, P., O. Boucher, B. Graham, J. Beck, O. L. Mayol-Bracero, G. C. Roberts, W. Maenhaut, P. Artaxo, and M. O. Andreae, Refractive index of aerosol particles over the Amazon tropical forest during LBA-EUSTACH 1999, J. Aerosol Sci., doi:10.1016/S0021-8502(03)00052-1, 2003, in press. - Mass scattering and absorption efficiencies are going to be published in a manuscript submitted to Journal of Geophysical Research-Atmosphere.

You note on pages 1376 and 1377 that no fire pixels were observed from AM and RO from satellite data during the end of the first campaign from 13-21 May and that smoke aerosol was likely transported from other regions. Is there any way to estimate the contribution of local biofuel burning to the observed aerosol? Would burning of wood, dung or propane for cooking or even diesel fuel from cars have a different signature than aerosol from crop burning? A way to estimate this may be to look at the aerosol data during the dry season during periods of very low wind speeds (< 3 ms-1) and compare this to times with longer range transport or higher wind speeds.

Response: The measurement site was located in a remote region and the area surrounding it was largely devoid of human activity. During the wet season the site could only be accessed by boat, some 5 hours journey from the town of Ji-Paranà, which is situated south of the site. Some new farming activity was occurring west of the measurement site, but the dirt road serving the few settlers living there was impassable at this time of the year. Thus, local anthropogenic contributions to the aerosol loading would be expected to have been very minimal. Wood is mostly used for cooking in the region, but this signature would be expected to form part of the background aerosol (if

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perceivable at all at our site), since there is no reason for an increase in cooking fuel consumption at this time of the year. The same is valid for our diesel generator, which was situated on a raft on the river, ca. 400 m from the tower, with the exhaust directed just above the water level. These details were added to the text.

On pages 1379-1380 the optically active aerosol layer during the smoke season is relatively low (1.1 km) but with a low r2 value of 0.44. This low r2 value may indicate a highly variable aerosol layer and/or many days with an elevated aerosol layer.

Response: Agreed. Nonetheless, we note that the period 12-21 May actually lies within the transition period between the wet and dry seasons, during which an increase in all the measured aerosol optical parameters occurred. This period may therefore not be best described by a linear regression. However, the results of the regression analysis do seem to provide firm enough evidence that small amounts of smoke have a dramatic influence on Amazonian background aerosol properties. The text was modified accordingly.

P. 1389. Because aethelometers typically do not have corrections for scattering, the absorption coefficients from these instruments will be higher than those from a PSAP.

Response: Correct, this may have contributed to larger values found at the pasture site; however, it is unlikely that the effect of scattering on the aethalometer measurements was solely responsible for the ca. five times larger values found at the pasture site. In recognition of the fact that the two instruments are not completely comparable, we also noted at this point in the text that the measured particle number concentration was about twice as large at the pasture site to indicate that the higher absorption observed at the pasture site was most likely not due to differences in the measurement techniques.

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 1367, 2003.