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Interactive comment on "Optical properties of humic-like substances (HULIS) in biomass-burning aerosols" *by* A. Hoffer et al.

Anonymous Referee #1

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The MS is an important contribution to the current debate on humic like substances (HULIS) and should be published. Some revisions, however, are necessary. I will list the points in the order of their appearance. Some of them are obviously minor, but some should definitely be dalt with to make th MS more accessible (and more valuable) to the readers.

Abstract, line 17: "causing a relatively high (up to 50%) contribution to the absorption at this wavelength." % of which absorption? Absorption by the biomass burning aerosol? Please add.

Section 2.1: how many samples in total were collected? When combining all daytime

and nighttime samples, how much mass of HULIS was obtained? How large was the contribution of HULIS to the TC aerosol mass concentration on average during the sampling period (on p 7350, you state an “assumption” that 35% of TC are HULIS)? As diel variations are mentioned at several points: was there a variation of HULIS / TC between daytime and nighttime samples?

Section 2.2: The only information on the size distribution of the HULIS aerosol is that the particle size is between 50 and 100 nm. Please give a plot of the size distribution. Was the bulk density of the aerosol calculated from the integrate number size distribution an the TEOM measurement? Please specify in the text. If the TEOM data were used: what evaporative losses are expected because of the heated inlet? Do HULIS evaporate (at lest slightly) at this temperature?

How were the truncation errors of the nephelometer calculated? For such a calculation, the refractive index and the size distribution of the aerosol are needed, but as the refractive index of the HULIS aerosol was derived from measurements of the scattering coefficient, there had to be some iterative procedure?

The measurements of absorption and scattering coefficient as well as bulk density were performed on an aerosol generated from a solution of HULIS in acetonitrile. The measurements of spectral absorption, however, were made on aqueous solutions of HULIS. It is not quite clear from the text how measurements of the spectral absorption characteristics were made. On p 7347 there is mention that the mesaurements were made on only one night-time sample - was this part of the combined sample or was it an individual sample? If so, do you expect this sample to be representative of all others, and why? On p 7349 absorption measurements are stated to have been made on “daytime and nighttime samples” - how many?

Why were two different solvents used? Is there an expected effect of solvent on the optical properties?

Section 3:

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General: In most of the text, the term HULIS is used for what is actually an aerosol generated with a nebulizer. As mass absorption and scattering coefficients of an aerosol depend on the size distribution, these results strictly apply only to a HULIS aerosol with this specific size distribution. The larger mass scattering coefficient measured for the night-time sample could be due to a different size distribution (the mass absorption coefficient is not so dependent on size distribution as the mass scattering coefficient), but size distributions are not given (please supply them in the revised MS).

Section 3.1: Why do you expect a diel variation of optical properties of HULIS?

p 7348, last par.: were the calculations by Horvath (1993) and Bohren and Huffman (1983) made for the same refractive index you obtained for the HULIS aerosol? If not, they might not apply, as the mass absorption coefficient depends strongly on refractive index. In this case, I would advise to run a Mie calculation for the proper refractive index.

p 7350, lines 17-20: sentence is incomplete.

Section 3.2 please specify that the mass absorption and mass scattering coefficients were obtained for the HULIS aerosol produced in the lab and not to HULIS as such.

Figure 1 and 2: please use larger fonts (or enlarge whole figure) - they are difficult to read on a printout.

Figure 3: please include instrument in figure caption

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 7341, 2005.