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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Characterization of carbonaceous aerosols during the MINOS campaign in Crete, July-August 2001: a multi-analytical approach" *by* J. Sciare et al.

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General Comments:

The paper is very interesting and arguably is of significant importance in highlighting possibly for the first time different signatures obtained of inferred levels of black carbon mass using different analytical methodologies on the same sampled filters of ambient aerosol from a mixture of sources. The results are of much scientific interest and highlight the present very unsatisfactory situation regarding the use of available techniques, with their individual associated artifacts, to infer levels of carbonaceous levels

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Discussion Paper

in the atmosphere. It seems to me that the analytical techniques cited in the paper probably work quite well for well defined laboratory generated carbonaceous samples. There are clearly severe problems, as evidenced from the paper, of applying the various Evolution Gas Analysis (EGA) protocols to the complex mixtures of carbonaceous aerosol from combined fossil fuel and biomass (and other) sources. There appears to be up to at least a factor of 2 uncertainty in inferred levels. There is a clear need for longer term field measurement campaigns which employ both insitu aerosol absorption measurements (using photoacoustic spectrophones for example) coupled with shorter time resolved samples (ideally sector controlled) for analysis by a range of analytical techniques in different regions of Europe so as to encompass a range of well defined different carbonaceous sources of different strengths and age.

Specific Comments:

1. In comparing the relation between BC (Thermal) and nss-sulphate, use could also been made of the 3 anthropogenic periods on their own to showed the presumably better correspondence between the 2 parameters for the more defined anthropogenic events, in addition to all the data (n=39) excluding biomass events. 2. Similarly the biomass events (n=17) can be used to compare BC (IMPROVE) with nss-K. It is not clear to me why all the data (n=56) is used when trying to show a greater sensitivity with biomass influence? (p.3385) 3. Again, in Figure 3, why not use the biomass event sampling data (though limited in number) - rather than nearly all the data (n=54) - to support the argument that there is better correlation between PSAP Absorption and BC (IMPROVE). Indeed if one examines Figure 3 more closely, one finds considerable scatter between PSAP absorption and BC (IMPROVE) below about 1.1 - 1.2 μg m-3, which is approximately the demarcation line between non biomass event values and biomass event values (Figure 2). So that one can use this large subset of more scattered data to illustrate that there is a poor correlation for more anthropogenically impacted samples. 4. I would like to suggest that the results of the work of Liousse et al (1993) could be used (on p. 3387) in the section on Mass Absorption Efficiency (MAE),

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to strengthen the evidence for a greater value of MAE in the case of biomass burning aerosol. Liousse et al (1993) found the highest values (of 20 m2 g-1) for biomass burning aerosol.

Technical Points/Queries, typing amendments, errors etc:

3374 Line (L) 16/17 mass concentrations were on average 1.19 .... 3375 L2 EGA's L4 an Analytical L6 'rough or approximate' instead of 'raw'; on a BC .. L 20: Krivacsy L 26: satellite observations (give references) 3376 L 11: at altitude 3377 L 1: and laser (give wavelength) L7: state name of ground station L8: above sea level L10: within 2... L15: Briefly, they L15 - L17: a) It is not made clear if they originate for the whole period from eastern Europe at the MBL site? Also given the relative inaccuracy of back trajectory paths , I find it difficult to understand how, with the 2 sites only 50 km apart, that one encounters air from E Europe only while the FT site encounters air from both W and E Europe? L19: Type of sampler should be described, filter size should be given L21: analysis are described by... 3378 L7 in the field L23 thus capable of collecting dust aerosol 3378 L6 punches 3380 0.02 μg per area (cm2) ? (should specify) 3381 L2 as with various L19 for 20... L23 Very good... L25 (Sciare et al not referenced) L26 within a 10% error 3382 L 17 important = high? L20 : specify wavelength value 3383 L 19 Such a trend L20 or inorganic 3384 L6/7 : 'could not be too high' : not clear (to me) what is meant ? needs rephrasing....does it mean '.. protocol may be too high'? L9: ratio which is too .. 3385 L5 with slopes of 1.09....L7 datasets L9 showed good.. L12 thus with different L19 EGA's L 21/22 IMPROVE) is better ...L27 in the literature 3386 L 11 'On the contrary' or 'on the otherhand' to replace 'In opposite' L 18 as being entirely 3388 L8 During the summer of 2000 L24 datasets 3389 L2 relative 3390 L3 '10 days' to replace 'decade'

3392 L5 at altitude L15 Figure 5 does not show the two biomass burning events... 3393 L14 1 μm 3394 L24 was (is) provided that... 3395 L6 datasets would be used for validating 3396 L2 the LSCE

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Interactive Comment

Figure 1 Laser Trans is a solid line. I do not see a 'black dash'. Not clear what the black dots represent ? Figure 5 Caption: last line '10 days' to replace 'decade' Figure 8 unit on y axis should be ng/m3

Table 1 NIOSH Temp values for BC4 in Table 1 of 850 degrees does not agree with the value in Figure 1 - which is about 775 degrees. Similarly, the BC5 value of 890 degrees is different from the Figure 1 value of about 850 degrees.

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 3373, 2003.