Atmos. Chem. Phys. Discuss., 10, C13230–C13233, 2011
www.atmos-chem-phys-discuss.net/10/C13230/2011/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Primary sources of $PM_{2.5}$ organic aerosol in an industrial Mediterranean city, Marseille" *by* I. El Haddad et al.

I. El Haddad et al.

imad.el-haddad@etu.univ-provence.fr

Received and published: 4 February 2011

First we want to thank reviewer 3 for raising these relevant comments and questions. We will provide below a point by point response to the reviewer questions.

1. Deployment of surrogate standards and associated uncertainties:

The use of surrogate standards to quantify organic compounds with no commercialized authentic standards can indeed give rise to additional uncertainties and biases that cannot be unfortunately evaluated (no commercialized authentic standards for comparison). However, we use the same quantification methodology that have been used for the determination of most of source profiles (Rogge et al., 1993;Schauer et al., 1999;Fine et al., 2002;Schauer et al., 2002), which would compensate systematic bi-

ases when these markers are used in the CMB.

2. Variability of OM-to-OC conversion factor:

OM-to-OC conversion factor is indicative of the oxidation state of the organic matter. In our case, during the field campaign, the day-to-day variability of this factor is no more than 10% (1.59<OM-to-OC<1.80), which is lower than the uncertainties associated with our measurements (EC/OC determination, AMS measurements, sampling artifacts ...). Therefore, we have chosen not to take into consideration this variability and apply an average conversion factor of 1.67.

3. Levoglucosan in Fig. 6:

In Fig. 6 we have reported the CMB calculated-to-measured ratios for all the samples and for all the included markers, even levoglucosan. However, the calculated-to-measured ratios for this marker were 1 ± 0.01, which explain that the box and whiskers representation of these ratios appears as one point onto the Fig. 6.

4. Contribution of dust:

The organic matter content in the dust is highly variable (Chow et al., 2003), depending on the geological origins of this dust (Saharan, urban, paved road, un-paved road, agricultural ...). As a result, the dust profiles, represented by the ratio between Al and OC (Al-to-OC), are highly variable spanning more than one order of magnitude (Chow et al., 2003). This can create the same variability in the CMB estimates for the contribution of dust to total organic aerosol, hindering the choice of one representative profile for this source in the CMB model. Therefore, we have chosen not to include this source our CMB analysis.

By contrast, the ratios of Al-to-PM are much more stable (ranging from 0.08 to 0.12), which enabled us to present a relatively accurate estimation of the contribution of dust to total PM.

5. CMB SOA precursors:

As pointed out by Reviewer 3, the good comparison between CMB fossil TC and total fossil TC, would imply that CMB SOA precursors are mostly from non-fossil origins. This remark is thoroughly discussed in the companion paper.

6. Comparison with AMS data:

Factor analysis of AMS measurements (AMS/PMF) was performed in this study. The results of this analysis will be treated in detail and compared with CMB in a distinct paper; currently in preparation. The main result of this intercomparison is that AMS/PMF and CMB sources apportionment approaches are in very good agreement, even for industrial sources. We believe that the comparison of CMB estimates with 14C data and the study of statistical data provide sufficient and reasonable bounds on our CMB results.

References

(1) Chow, J. C.; Watson, J. G.; Ashbaugh, L. L.; Magliano, K. L.: Similarities and differences in PM10 chemical source profiles for geological dust from the San Joaquin Valley, California, Atmospheric Environment, 9-10, 1317-1340, 2003.

(2) Fine, P. M.; Cass, G. R.; Simoneit, B. R. T.: Chemical Characterization of Fine Particle Emissions from the Fireplace Combustion of Woods Grown in the Southern United States, Environmental Science and Technology, 7, 1442-1451, 2002.

(3) Rogge, W. F.; Hildemann, L. M.; Mazurek, M. A.; Cass, G. R.; Simoneit, B. R. T.: Sources of Fine Organic Aerosol .5. Natural-Gas Home Appliances, Environmental Science and Technology, 13, 2736-2744, 1993.

(4) Schauer, J. J.; Kleeman, M. J.; Cass, G. R.; Simoneit, B. R. T.: Measurement of Emissions from Air Pollution Sources. 2. C1 through C30 Organic Compounds from Medium Duty Diesel Trucks, Environmental Science and Technology, 10, 1578-1587, 1999.

(5) Schauer, J. J.; Kleeman, M. J.; Cass, G. R.; Simoneit, B. R. T.: Measurement

of Emissions from Air Pollution Sources. 5. C1âËĘ'C32 Organic Compounds from Gasoline-Powered Motor Vehicles, Environmental Science and Technology, 6, 1169-1180, 2002.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 25435, 2010.