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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Chemical characterization of fine organic aerosol for source apportionment at Monterrey, Mexico" *by* Y. Mancilla et al.

Anonymous Referee #3

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Journal: ACP Title: Chemical characterization of fine organic aerosol for source apportionment at Monterrey, Mexico Author(s): Y. Mancilla et al. MS No.: acp-2015-282 MS Type: Research Article

Anonymous Referee comments.

General comments.

In this study the results obtained from the analysis of a data set of chemical composition (OC, EC and organic molecular markers) in PM2.5 samples recorded during sampling campaigns at Monterrey (Mexico) are shown. The sampling campaigns were carried

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out in the Spring and Autumn seasons during 2 consecutive years. PM samples were obtained for day and night 12 hours consecutive periods. Molecular diagnostic ratios and a chemical mass balance model were the main techniques used to analyses the data sets with the aim to identify sources and origins of the fine organic aerosol and estimate mass contributions.

In my opinion the design of the study was not the best possible. It is not clear the reason why the authors performed the sampling campaigns in spring and autumn. It would have been better to obtain samples in winter and summer, when the emissions from anthropogenic sources and the formation of secondary organic aerosols, respectively, are usually more intense. The CMB was not performed for the spring and autumn periods, separately. Otherwise, the collection of day and night samples is not justified taken into account the main results of the paper, where the CMB was not performed for both groups of samples, too. In fact, there was not any significant result in the conclusions section, in relation with the source apportionment of fine organic aerosol in the day and night periods. Moreover, sampling periods longer than 12 hours could probably avoid the need to composite many samples to obtain higher concentrations of the organic compounds. This is one of the main shortcomings of the study. The resulting low number of representative samples (43) has probably hampered the identification of sources and the estimation of PM contributions to a certain extent. The number of representative samples used to perform the CMB, was even lower than 43. This number was not specified in the section 3.6. Finally, it should be stressed that a lower number of organic compounds were determined in the first (spring 2011) than in the other sampling campaigns.

In brief, I think that the present work does not show any significant and/or novel contribution to the global scientific community in relation with the source apportionment of fine organic aerosol. I agree with one of the conclusions reported by Referee #1 in his/her preliminary review: “the findings and the interpretations throughout the paper cannot convince me that such a study could be published in high-quality journals such

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as ACP". For these reasons I must recommend the rejection of the paper acp-2015-282 to be published in ACP.

Specific comments.

The authors should justify the relevance for the global scientific community of an urban site at the Monterrey Metropolitan Area, to perform a source apportionment study of fine organic aerosol. What are the specific features of this area in relation with other urban areas that justify this study?. More details on the characteristics of the MMA car fleet (% of diesel and gasoline vehicles, % of passenger cars, trucks,...) and the industrial activity should be included in the text.

The occurrence of occasional biomass burning events due to regional transport should be confirmed, instead of being suggested, by means of a comprehensive analysis of meteorological data sets. The occurrence of stagnation events, which are supposed to influence the formation of carboxylic acids, as it was mentioned in the text, should be also characterized.

Taking into account that, as stated by the authors in page 17982, lines 23-25, the diagnostic ratios should be interpreted with caution because many of the organic molecular markers are emitted from a variety of sources, it is really surprising that most of the paper was devoted to the interpretation of these ratios. Otherwise the discussion of the CMB results is much more reduced.

The relative high contribution levels of the meat-cooking source (which are even higher than the gasoline-traffic contribution) to the measured PM2.5 mass obtained by the CMB, has not been discussed in detail in the text.

The interpretation of Figure 6 is somewhat confusing. Does it represent the source contributions to the PM2.5 mass or to the OC mass in PM2.5?. Since the sum of contributions was 100%, where is the 35% of the unidentified mass?.

It is really surprising that the authors highlighted the "potential of industrial sources"

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in the study area taking into account that they could not obtain an estimation of their contribution to the PM2.5 mass.

Technical corrections/Typing errors.

Page 17976. Line 17. Correct “The values li sted. . .”. Page 17986. Line 15. Correct “in in 80%...”.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 17967, 2015.