

***Interactive comment on “On the chemical nature of the oxygenated organic aerosol: implication in the formation and aging of  $\alpha$ -pinene SOA in a Mediterranean environment, Marseille” by I. El Haddad et al.***

**Anonymous Referee #3**

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**General Comments** The authors present a third paper in what appears to be a four part series on the aerosol measurements made in Marseille in summer 2008. Detailed measurements of this nature are very valuable and the quality of the work appears high. The manuscript is well written and clearly makes the point that the main contributor to organic aerosol at this time was long-range transport of biogenic organic aerosol. As far as I can tell, the only new results presented in this work are the four factors of OA identified by PMF2 on the AMS measurements. While this would have been a better fit in the previous paper—since the methods and sampling site are identical—the authors

C7154

do provide additional evidence that biogenic organic aerosol predominates the OA in Marseille. In addition, AMS measurements are made across many research groups and having this type of data is valuable for comparison. It is clear that authors have put a great deal of thought into these factors and their interpretation, but whether or not this new information merits an entire new manuscript is unclear to me. Aside from this issue, the manuscript itself very close to being ready for publication. I have only minor comments.

**Detailed comments** AMS/PMF2 measurements provide more insight into the organic aerosol makeup than the CMB model. However, it unclear that we understand any more about the system from the PMF results. Figure S9 shows just how similar the results were for the PMF and CMB results. In the previous paper (El Haddad et al., 2011b) the authors showed that "Radiocarbon measurements suggest that more than 70% of this fraction is of non-fossil origin, assigned predominantly to biogenic secondary organic carbon (BSOC)" and that "Using the marker-based approach, the aggregate contribution from traditional BSOC was estimated at only 4.2% of total OC and was dominated by  $\alpha$ -pinene SOC accounting on average for 3.4% of OC." It seems like the conclusion in the new manuscript do not differ from the previous results or even improve upon them substantially. The only new finding I see the is the correlation of each factor with other metrics. Given that the PMF analysis was constrained by these external factors in the first place, it is not surprising that they correlate. In order to justify this paper, I would need to see something substantial from the PMF results that could not have been discovered without them.

Table 1 is a bit confusing because I am looking for the groups of compounds which correlate to one another but it's hard to see how they are grouped when they are listed in order. Numerical order makes some sense, but it would be better to highlight the compounds that are somehow connected more clearly.

Figure 2. The absolute concentration of all the factors follows the same general trend (as do many of the tracers). The traces do seem to line up as assigned, but it should

C7155

be noted that when the levels of OA increase, all the factors should increase to some extent. It may be more useful and more meaningful to show the factors as fractions of OA instead.

Technical Comments: Pg 19779 line 12: replace "emphasis" with "emphasize"

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Interactive comment on Atmos. Chem. Phys. Discuss., 12, 19769, 2012.

C7156