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***Interactive comment on* “Sources and chemical characterization of organic aerosol during the summer in the eastern Mediterranean” by E. Kostenidou et al.**

Anonymous Referee #2

Received and published: 19 March 2015

The manuscript by Kostenidou et al. presents chemical composition and sources of fine particulate matter in the Eastern Mediterranean based on AMS measurements in the suburbs of Patras and Athens and subsequent PMF analysis. There are not too many studies on air quality in the Eastern Mediterranean, which makes the present analysis an important addition. I recommend publication in ACP after the following comments have been addressed:

General comments:

Please add more info and clarifications to the site descriptions. Especially for Patras

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it is not clear to me at which of the two sites mentioned the instruments described in section 2.3. were measuring. Also add a map that shows the locations of the 2 sampling sites in Patras, and their position relative to the sampling site in Athens.

The measurements in Patras and Athens could not be done at the same time due to experimental limitations, I can see that. However, to still be able to make some comparisons between the two sites you could compare parameters that were measured simultaneously (meteorology? SMPS? Etc.). This would give an idea of how different the meteorological and pollution situation was for the 2 measurement periods, and how that potentially influences AMS mass loadings.

There are quite a few comparisons in the manuscript between PM1 and PM2.5 data, e.g. sulfate for the CE, and (section 3.1) OM and Org. This can be done, but discrepancies should specifically be discussed for the size difference. Also, what conclusions are drawn based on the comparison in section 3.1 (p. 3463, l. 23 – 26)? Section 3.2 (p. 3465, l. 8 – 12): How can AMS PM1 be higher than PM2.5? This needs to be elaborated.

What is the reasoning behind calling the 2 non-biogenic OOA factors V- and M-OOA, and not LV-, and SV-OOA, respectively? Are they significantly different from literature LV- and SV-OOA factors? If yes, this should be mentioned, otherwise I suggest renaming the factors.

I am a bit confused by the interpretation of the two factors called HOA-1 and HOA-2. P. The factor profile of HOA-1 is similar to HOA factor profiles found in literature, however its factor time series does not correlate with traffic marker time series. The HOA-2 factor profile resembles COA, the diurnal pattern of the time series indicates contributions from cooking emissions, however its time series correlates also with BC. When you did ME-2, was HOA fixed? I wonder whether the different PMF solutions and their rotations could specifically be explored for a distinction of the different primary organic sources.

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Specific comments:

P. 3456, l. 15 – 16, and throughout manuscript: P. 3459, section 2.1.: Is there a reference about the larger study you could add? If not consider adding a few sentences on this study here.

P. 3462, l. 1 -4: Add reference to the supplementary information. Also, add (here or in the supplement) information on the ME-2 settings you used – which factor spectra were fixed, how fixed were they, etc. You also mention in the SI several times that you chose $f_{\text{peak}=0}$ because for $f_{\text{peak}=0}$ Q/Q_{exp} was minimized. $f_{\text{peak}=0}$ will always produce $Q/Q_{\text{exp}} = \text{min}$, you specifically use $f_{\text{peak} \neq 0}$ to distort the solution (compare Ulbrich et al., ACP, 2009).

P. 3462, section 2.6: Concerning the CE in Patras, do you have any information on ambient RH? Can you see a dependency of the CE on RH?

P. 3469, l. 18: What about the influence of boundary layer height? Temperature?

P. 3472, l. 15 – 16: Add more information on the meaning of this plot and your data in this plot. Just showing it is of no scientific value.

Technical comments:

P. 3456, l. 2: Should read “The concentration and chemical composition of non-refractory [...] (delete “the”)

P. 3456, l. 11: Should read “In both cases PM1 [...]” (delete “the”, and check throughout manuscript for more of such “thes”)

P. 3456, l. 25: Should read “by causing cardiovascular [...]”

P. 3457, l. 1: Update reference to latest IPCC report

P. 3457, l. 4: Should read “contributes to [...]” (check throughout manuscript for more)

P. 3457, l. 6: Use HR-ToF-AMS for instrument abbreviation

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- P. 3457, l. 6: Should read “high time resolution [. . .]”
- P. 3457, l. 25: Typo, should read “spray”
- P. 3457, l. 27: Concretize studies, e. g. “Most of the studies on air quality [. . .]”
- P. 3457, l. 29: Delete “just”
- P. 3458, l. 11: Replace “higher with “more”
- P. 3458, l. 16: Should read “[. . .]was of industrial origin.”
- P. 3458, l.16 – 20: Very complicated sentence, consider breaking it up into 2.
- P. 3458, l. 29: Replace “very hard”.
- P. 3459, l. 7 – 9: Consider adding a couple of sentences more on the objectives of the paper.
- P. 3459, l. 12: Replace “results” by “measurements”.
- P. 3459, l. 18: Major anthropogenic activities?
- P. 3461, l. 2: Most densely populated?
- P. 3461, l. 12: The aethalometer measures absorption and derives BC concentrations
- P. 3461, l. 13: Delete comma after “classifier”
- P. 3462, l. 6: Should read” throughout”
- P. 3469, l. 1: Delete ”while”; “Similar” instead of “similarly”
- P. 3470, l. 3: Should read “while BC originated from [. . .]”
- P. 3460, l. 19 – 20: Replace “correspondingly” by “, respectively”
- Supplemental information, figure caption S3: “suggests” instead of “suggest”

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