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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The contribution of wood burning and other pollution sources to wintertime organic aerosol levels in two Greek cities" *by* Kalliopi Florou et al.

Anonymous Referee #1

Received and published: 19 September 2016

This paper presents results from high resolution time-of-flight aerosol mass spectrometer measurements made during the winter of 2012 and 2013 at two different major cities in Greece (Athens and Patras). The composition of the aerosol is presented and discussed. Positive Matrix Factorization (PMF) analysis results are provided to explore the different sources of organic aerosol in the two cities, with a specific aim at better understanding the role of residential wood burning.

Biomass burning is one of the main sources of organic aerosol, but its contribution is still not well understood. In addition, the role of biomass burning as a source is becoming more and more important in many locations. This paper is presenting results from one such location. Therefore, many in the atmospheric community would be

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interested in this work.

Overall, this is a good paper. The authors have done a nice job with the paper. I really appreciate seeing all parts of the PMF analysis to understand how they obtained their results. I am mainly wondering if the authors have considered trash burning as possibly playing a role in their results and could be part of what leads to the two BBOA factors being identified in Patras. Otherwise, I just have a number of comments to help with the flow of the paper, like clarifying the notation for BBOA-I and BBOA-II in the figures which the authors seem to go back and forth on using. All of this is outlined below in detail and needs to be addressed before the paper can be considered for publication.

Specific Comments: 2.Experimental Section 2.1.Measurement Sites Line 96 – Suggest changing till to until

Line 97 – Suggest changing place at to place on

2.2.Instrumentation Line 106 – Suggest changing real time to real-time

Line 117 – The start of this line should be indented to match the rest of the formatting of this section.

Line 133 – The chemical abbreviations used are not defined

Lines 101-142 – If the authors were looking for a way to shorten the paper, they could remove some of the discussion in the instrument section pertaining to data they do not show in the paper. I believe that data from the SMPS, thermodenuder, some of the gas monitors, and filters are not presented or discussed in the text.

2.3.AMS Data analysis Line 160 – m/z should be in Italics

3.Meteorology Line 186 – Suggest changing meteorological conditions to air masses observed

4.PM1 chemical composition and characteristics 4.1.PM1 chemical composition Lines 224-229 – In this line the authors are discussing OA being correlated with VOCs found

in petrol fuel. But I am a bit unclear if it is during the same times as when OA was correlated with acetonitrile (18:30-02:30) or the remaining period they are also discussing in this paragraph.

Lines 240-244 – The authors mention that chloride has a major morning peak and an evening peak. They mention the pools located near the sampling site as a possible source. But could this also be due to trash burning? I would expect that if trash burning is occurring, it would peak in the morning before the boundary layer started to rise.

Line 260 – Suggest adding a the before value

Line 261 – Suggest adding the word peaked after OA

4.1.1.Organonitrates Line 266 – The chemical abbreviation used is not defined

Lines 276 and 278 – Suggest changing till to until

5.Source apportionment of OA Line 313 – Suggest changing time-series to time series

5.1.Biomass Burning-related Organic Aerosol Lines 367-379 – In this section the authors are discussing the difference between BBOA-I and BBOA-II. I was wondering have the authors checked to see if one of these factors is more correlated with chloride than the other? It was shown that there was an extra chloride peak in the diurnal profile and chloride can come from trash burning.

Lines 413-425 – In this section the authors are comparing the BBOA spectrum obtained at both sites to those from literature. Although this is interesting, the spectra the authors are comparing to includes both residential burning and burning from wildfires and prescribed burning. My understanding is that the data collected from Greece should be impacted by residential burning. I am not sure if the authors have taken this into account in their comparison.

Line 424 – I am not sure if the correct reference is listed. I don't believe there are any AMS spectra provided in that paper.

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5.2.Oxygenated Organic Aerosol (OOA) Line 434 – Suggest changing summertime at to summertime in

Line 438 – The period for the end of the sentence is missing after processes

Lines 449-453 – The authors mention that the diurnal concentration of OOA decreased in the morning and then increased again in the afternoon peaking at midnight. They believe this could be due to nighttime SOA production from biomass burning-related VOCs reacting with NO3 radicals. I am not sure I am completely following this discussion. For this to be true, wouldn't there have to be organonitrates present then? I believe that it was mentioned earlier that when biomass burning dominated organonitrates were low.

Line 454 – Suggest removing the word reasons

Lines 467 and 476 – Suggest adding a the before Po

5.4.Cooking Organic Aerosol (COA) Line 546 – Figure 10a is being referenced, but there is no Figure 10. Should it be Figure 8?

Line 551 – Suggest adding the words had only before minor

References Line 612 – Believe accent marks are missing on Prevot

Line 630 – Should the a before Li be capitalized?

Line 639 – Believe accent marks are missing on Prevot

Line 667 – Should the a before Herndon be capitalized?

Line 692 – The a after Prevot should be capitalized

Line 720 – There is an added hyphen in Seinfeld

Line 724 - The a after Boreave should be capitalized

Lines 758 -760 – All the a initials should be capitalized

Line 774 - The a before Knighton should be capitalized

Line 775 - The a before de Foy should be capitalized

Lines 783-785 - All the a initials should be capitalized

Line 793 - Believe accent marks are missing on Prevot

Line 809 – The a after Nenes should be capitalized

Line 842 – The a before Alfarra should be capitalized

Line 843 - Believe accent marks are missing on Prevot

Line 866 – The a before Querol should be capitalized

Line 886 – I believe the year is listed in the wrong place

Line 910 – The a before Facchini should be capitalized

Line 925 - Believe accent marks are missing on Prevot

Line 929 – The a before Forster should be capitalized

Line 934 - All the a initials should be capitalized

Line 949 – The a after Chaloulakou should be capitalized

Line 953 – The a before Nitrogen should be capitalized

Lines 963-964 - All the a initials should be capitalized

Lines 973-974 - All the a initials should be capitalized

Tables Table 1 -I believe that not all the chemical abbreviations used in the Table have been defined in the text, for example EVK and MBO

Figures Figure 2 -I am not sure what the 124 in the OA plot is referring to. It is not mentioned in the caption.

Figure 6 -I believe that BBOA is actually BBOA-I and BBOA-I is BBOA-II. To stay consistent with the previous figure and the text it would be best to label them as I and II.

Figure 7 -I am not sure what the 30 in the HOA plot is referring to. It is not mentioned in the caption.

Supporting Information Figure S2 -Suggest adding to caption that the figure is showing the origin of the air mass every 3 h for all the sampling days

Figure S3 -In caption, suggest removing the hyphen from back trajectories

Figure S4 -In caption, suggest removing the hyphen from back trajectories

Figure S5 -Suggest adding to caption that the figure is showing the origin of the air mass every 3 h for all the sampling days

Figure S6 -What do the red boxes indicate? It is not mentioned in the caption

Figure S8 -What do the dashed lines indicate? Is it the average ratio? It is not mentioned in the caption.

Figure S9 -What do the dashed lines indicate? Is it the average ratio? It is not mentioned in the caption. -In caption, suggest removing the comma after Patras

Figure S11 -There are no letters identifying the plots as indicated in the caption

Figure S12 -There are no letters identifying the plots as indicated in the caption

Figure S14 -In caption, I believe there is a word missing after stable. Maybe something like solution or area -In first line of caption, fpeak is misspelled

Figure S15 -The label on the right-hand y-axis of plot d is missing

Page 17 -I believe the plots shown on this page are a repeat of Figure S11 and show the data for Patras and not Athens

Figure S19 -The letters identifying the plots do not match the caption

Figure S22 -In order to match the text, I believe that the plot labeled BBOA-1 is really BBOA-II and the plot labeled BBOA is really BBOA-I

Figure S23 -In order to match the text, I believe that for the legend labels BBOA-1 is really BBOA-II and BBOA is really BBOA-I

Figure S24 -In order to match the text, I believe that the plot labeled BBOA-1 is really BBOA-II and the plot labeled BBOA is really BBOA-I

Table S1 -I believe Table S1 is not referenced in the text and that it is also an exact copy of Table 1

Table S2 -I believe Table S2 is not referenced in the text

Figure S29 -In the caption and in the graph title, it should be BBOA-II

Figure S34 -This figure is referenced before Figures S32 and S33

Figure S35 -I believe there is no reference to or discussion about this figure in the text

Figure S36 -I believe there is no reference to or discussion about this figure in the text

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