

# ***Interactive comment on “Composition and variability of gaseous organic pollution in the port megacity of Istanbul: source attribution, emission ratios and inventory evaluation” by Baye T. P. Thera et al.***

## **Anonymous Referee #1**

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This paper investigated the gas phase pollution in an overwhelmed megacity Istanbul. By performing PMF analysis they try to investigate the origin of the organic gas phase pollutants and estimate their contribution. The type of analysis itself is not unique and has been applied to various data set. However, the results are unique in a sense that they provide for the first time online gas phase analysis in Istanbul, which is considered a polluted city. I recommend publication of the manuscript with a major revision concerning the PMF analysis and some other minor clarifications.

According to the times series and diurnal figures (Fig 7 and 8) all the extracted factors

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have more or less the same trend: they all increase after midnight until morning and then they all decrease with almost flat behavior during the rest of the day. This is not what is expected from a PMF analysis. It seems that the separation of the different sources is poor. If all the sources are always reaching the site all together at the same time from the same direction, then PMF is unable to separate them. What is the  $R^2$  of the time series of the 5 factors between each other? How do the solutions do like in the case of 3 and 4 factors? I', afraid that if the interpolation was done in periods with a lot of missing points in a row then the PMF results may be significantly altered. How do the solutions look like if you only use the real measurements without any interpolation?

General comments:

1. Abstract: The abstract is too long. It should be shorter and more condense in a way that the reader gets only the important information. It should be more educational and provide the translation of the results.

2. Introduction: The authors use quite old literature (15-20 years old). They should enrich/replace/add more recent citations. In addition in lines 84-92, where the authors describe other VOCs studies in cities in the eastern Mediterranean, and in lines 116-118, where the authors refer to previous VOC PMF analysis, they have ignored an important study in Athens and Patras (Greece) by Kaltsonoudis et al. (2016): Temporal variability and sources of VOCs in urban areas of the eastern Mediterranean (ACP), where online VOCs were measured and PMF analysis was performed following a very alike concept with the present paper. The author should provide a comparison with respect to the results of Kaltsonoudis et al. (2016) as Athens is one of the important Mediterranean cities.

Specific comments:

3. Lines 152-153: Why did the authors use Teflon tubing instead of silcosteel or stainless steel tubing for VOC sampling? Teflon has a memory effect which could affect the measurements. What were the losses of certain VOCs in this 3m Teflon line?

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4. Lines 234-235: Which data set of isoprene, benzene, toluene and C8 aromatics concentration were used in the PMF? Those taken by the PTRMS or those by GC-FID or was the average of these 2 instruments? Please explain.
5. Line 241: Linear interpolation is accepted if there is one or two missing points between two measurements. If the missing points correspond to several hours between two measurements, then the interpolation does not necessary represents the real ambient concentrations. In this meantime the concentration could have changed a lot and an interpolation could lead in fake results. So, the criterium of using or not interpolation is not the total missing points (in your case 40%) but where there points are located/ distributed between the measured points (how long a missing a period 1 hour? 5 hours? 10 hours? Please clarify that.
6. Lines 321- 330: This part is not clear to me. What is the “one VOC fingerprint” and the “other VOC fingerprint”? What is the goal of this paragraph?
7. Lines 331-387 (Section 3.2.2): This section is not well organized. For example, the authors discuss the diurnal profiles of NO<sub>x</sub> in the lines 338-339 and they go back again to NO<sub>x</sub> diurnal cycle in lines 371-375. The CO and VOC diurnal patterns are also repeated. Please first discuss the time series and then the diurnal profiles.
8. There also some contradictions. In the lines 338-339 it is written that the NO<sub>x</sub> shows a clear diurnal profile with a maxima at midday, which is wrong according to Figure 5a where the NO<sub>x</sub> profile has 2 maxima coinciding with the morning and the evening traffic. Then at lines 371-375 it is stated that the NO<sub>x</sub> profile has 2 peaks and in the evening, which is actually what is shown in Figure 5a. Please delete the wrong description.
9. Lines 334-335: NO<sub>x</sub> and CO are described as air quality trace gases? Why? So if NO<sub>x</sub> and CO are in low concentrations it means that the air quality is good enough?
10. Lines 391-398: Isoprene is reducing after 13:00-14:0, which implies possible con-

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sumption thus the corresponding isoprene products (MACR+MVK) should increase. But they don't. Please explain. Also explain why in period 2 MACR+MVK are increasing during the night. MACR+MVK have very similar profile to benzene and isopentane for both periods 1 and 2. Is it possible that m/z 71 (related to MACR+MVK) has interferences from other compounds related to anthropogenic activities? Please discuss.

11. Lines 394-395: If furans contribute to isoprene signal (m/z 69) then this is an interference of another/different compound to this m/z. It is not an anthropogenic origin of isoprene. Please correct the corresponding sentence.

12. Lines 400-402: What does it mean a secondary source? Maybe you want to replace it with origin? Please rephrase.

13. Lines 444-445: It is strange that isoprene has only 5% to the biogenic factor. This indicates that most of the signal in this m/z is probably attributed to other compounds rather than isoprene. Please discuss.

14. Lines 481. Again, are you sure it is isoprene?

15. Lines 486-487: Could you give some examples of "primary biogenic hydrocarbons"?

16. Line 497: No, the diurnal profile of the Factor 4 has the opposite behavior according to Fig 8. Please correct the text.

Technical comments:

17. Figure 2: The 2 lower graphs need a black line (y axes) on the right in order to be like the 2 upper ones.

18. Figure 3: Please increase the font of the letters.

19. Figure 4: Please put a black line on the top of the graph all make all axes line with the same thickness. "NO<sub>x</sub>\_Bskts & site" is not an appropriate name for an axis. Please replace it with "NO<sub>x</sub>".

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20. Figure 5: Please replace “NO<sub>x</sub>\_Bskts” and “CO\_site” with “NO<sub>x</sub>” and “CO” correspondingly.

21. Figure 6: Replace “Conc.” with “Concentration (ppbv)” on the left axes. Instead of Factor 1 ,2 etc. please write the names of the factors so that the reader doesn’t go back and forth.

22. Figure 7. The graph needs a black line (y axes) on the right. Please increase the fond of the letters and replace “date” with “Date and time”.

23. Figure 9. Please increase the fond of the letters.

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