

Interactive comment on “Source apportionment of volatile organic compounds in the north-west Indo–Gangetic Plain using positive matrix factorisation model” by Pallavi et al.

Anonymous Referee #1

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1 Overall comment

This study focuses on the source apportionment of VOCs measurements at a suburban site in the North-West Indo–Gangetic Plain. The period studied is the month of May 2012. Authors use a Positive Matrix Factorization Model (PMF) to resolve source contributions to VOCs, perform a conditional probability functional analysis to locate the different sources and calculate the ozone and secondary organic aerosols formation potential. Moreover, results of PMF are compared with the source apportionment of three different emission inventory estimates.

Overall, the analysis performed is interesting and valuable. However, the manuscript

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needs improvements in the logical framing of the work with respect to its contribution and implications to the field. Also the introduction and the results need to be improved in this sense. I recommend publication after the authors have addressed the following substantive concerns/comments on their manuscript.

2 Major comments

1. ABSTRACT - the abstract is a bit too technical. I recommend to focus more on the big picture and major findings and implication of the paper (as outlined in the conclusions).
2. INTRODUCTION - the introduction should better frame the background of the study, its motivation and what is the new contribution of the work. In particular:
 - Only one source receptor modelling study that has been cited is in the region of the study (Srivastava et al., 2005). Are there any source receptor modelling or more general studies that focus on VOCs over the IGP? If yes, they should be acknowledged. If no, this should be underlined.
 - VOCs source apportionment estimates for the region under study are presented for different emissions inventories. However it is claimed ‘Considering the large discrepancies between bottom up inventories and different source receptor modelling studies’, when 2/3 source receptor models studies presented so far are out of the understudied region. This claim need to be justified, or more appropriate studies need to be cited.
 - The study take into consideration a specific month, May 2012. It is needed to explain why this month is important for the region under study and which general conclusions can be made from it.

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- The aims of the paper need to be better outlined (e.g. in the last paragraph of the introduction the comparison with emissions inventories is not mentioned in the objectives).
3. METHODS - The description of methods should be revised in its content. In particular:
- Why have authors chosen to use the US EPA PMF 5.0 model? A brief motivation and description of the model need to be provided along with relevant references.
 - Almost the entire part of the methodology in Section 2.4 and 2.5 is left to the supplement or to other studies. Since it is a fundamental part of the methodology used in this the study, I would suggest to expand these sections. On the other hand, the detailed description in section 2.2. is not really relevant for this study, and should be cut/shortened.
 - The description of the methodology used to compare results of this study with the emission inventories estimates should be outlined.
4. RESULTS AND DISCUSSIONS -
- Overall results are too descriptive, and there are repetitions of information that figures already provide. I suggest to focus more on what can be deduced from the analysis rather than on its description.
 - Section 3.8 presents the comparison between the source apportionment study and emission inventories estimates, i.e. a point vs gridded data. Is it sufficient to filter gridded data for LAT LONG from which air mass trajectories reach the site within one day to make the comparison reliable? Moreover, the study consider May 2012, while emissions inventory data are for 2008/2010. Which are the uncertainties in using these approaches in the comparison? Authors should justify and better describe these choices.

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5. CONCLUSIONS - It would be more valuable for the reader if the authors focused more on the achievements and implications of the results. The last paragraph of 3.8 may be included in the conclusions rather than in results.

3 Minor comments

1. First author name (Pallavi) is missing.
2. Page 2 line 5 '...deserve further study' this sentence need citation.
3. Page 2 line 31 '...and strong photochemistry' this sentence need citation.
4. Section 2.3: need to add cross references to Table S3, Figure S4 a, b c.
5. Pag. 9 line 16 'However, Figure S5..'. It is Figure S6 in the Supplement.
6. Figure 1 (b): add lat - long grid. It may be worth to add in the caption the exact coordinates of the site.

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