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Discussions

# *Interactive comment on* "Sources and atmospheric dynamics of organic aerosol in New Delhi, India: Insights from receptor modeling" *by* Sahil Bhandari et al.

Anonymous Referee #2

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General comment The paper is focused on characterisation of organic aerosol in New Delhi (India) using an ACSM and some additional measurements. The approaches used with PMF receptor model allow to get some information about the sources and the trends in primary and secondary organics. The topic is interesting, up-to-date and suitable for the Journal. In general, it is not easy to read this paper because most of the figures and results are reported in the supplementary material (73 pages) that seems to be richer than the main paper. Authors should think about bringing some of the main results in the paper removing them from the supplementary material. His at least for the results that authors say to be important like the relationships with PBL height or the influence of the ventilation coefficient. Further, there are some aspects that are not

clear (see my specific comments) that should be addressed in a revision step.

Specific comments

Abstract. Thermodynamic modelling. What kind of modelling and for what?

Abstract (and also in the main text). Authors speak of inter-annual variability, however, having only 15 months of measurements, the possibility to see an inter-annual trend is optimistic to say the least. I would suggest to change this aspect.

Page 2 (line 8). Molecular markers such as. . .?

Page 2 (lines 21-32). I agree that the high temporal resolution could furnish additional information compared to receptor models applied to 24h samples. However, in the case of using ACSM only some chemical species are available and there are limitations due to the missing information on metals and other compounds (for example levoglucosan and similar). This aspect should be clearly mentioned and a reference to the recent work of Belis et al (Atmospheric Environment 123 (2015) 240e250) regarding PMF and receptor models performances should be added.

Section 2 (methods). ACSM is working on PM1 instead, other measurements have been done on PM2.5. Why not on the same size fraction? The differences should be explained. In addition, BC, and UVPM are not shown at all in the main paper but only in the supplementary material is this meaning that these species are not so important in the framework of the results?

Page 3 (section 2.1). Fifteen months divided into six seasons, why not using calendar seasons, I mean one year divided in four seasons?

Section 2.2. How it is used CO? In the PMF? Again, no trace of CO is reported in the main text.

Page 5 (lines 26-28). It is reported that OOA correlates strongly with both sulphate and nitrate. However, in several sites nitrate and sulphate have different seasonal

trends with sulphate larger in the warm seasons and nitrate larger in the cold seasons because of its thermal instability. This is true for both ammonium nitrate and sodium nitrate coming from aged marine salt. If I have well understood there is a correlation between SOA with both nitrate and sulphate suggesting that at this they have the same trend. Is this true? In case it will be useful to discuss this aspect mentioning explicitly the similarity in these trends that is not often observed at other sites.

Page 5 (line 30-31). Actually, looking at Figure 2 POA and OOA seems quite comparable. Are the difference mentioned statistically significant?

Page 7 (lines 9-10). This sentence is not correct because at night there is not a decreasing PBL, rather at sunset a new shallow boundary-layer is established generally thermally stable that could trap pollutants and will evolve at sunrise the day after mixing air from ground level with air masses above, see for example Meteorologische Zeitschrift, Vol. 21, No. 4, 385-398 (August 2012). I believe that authors should explain better this part.

Page 12 (lines 14-15). These percentages are really so different statistically?

Page 12 (lines 18-19). The larger primary emissions during cold months is not reflected in the percentages above because the maximum appears to be during spring.

Figures 3b and 3c. The intercepts are missing, are they negligible?

Figures 4, 5, 6, and 7. Please report in the caption what is the difference between continuous lines and marks.