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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Airborne particles in the Brazilian city of São Paulo: One-year investigation for the chemical composition and source apportionment" *by* Guilherme Martins Pereira et al.

Anonymous Referee #1

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General comment

This paper reports an analysis of PM2.5 and PM10 chemical compositions in Sao Paulo (Brazil). The information is used for source apportionment using PMF receptor model and to investigate some atmospheric processes. The approach is not particularly new, however, the chemical investigation is very detailed and used to interpret some processes involving fine and coarse fractions of aerosol. Therefore, I believe that it would be interesting for readers and scientist. There are some parts of the paper that are not completely clear and interpretations not fully discussed (see my specific comments).

In conclusion, I suggest to consider the paper for publication only after a revision that addresses all my specific comments.

Specific comments

1) Number of chapters and subchapters are inconsistent.

2) It would be better to mention that also metals are analysed in the abstract otherwise the reader should wait several pages before to understand that also some metals are investigated.

3) Section 1.2. The height of the back-trajectories used start at 500 m that are not exactly near the ground. Why a lower starting point has not been chosen?

4) Section 1.4 (line 180). It is reported that PMF was applied to PM10 but I understand that all data including PM2.5 were used together. Please correct this incongruence.

5) Equation (3). The symbol EC was already used for elemental carbon, another symbol should be used in this equation otherwise it is confusing.

6) Section 3.1 line 210. Why correlation with minimum relative humidity and not with the average relative humidity measured during the collection of samples?

7) Section 3.1 lines 226-227. It is not clear why a comparison with London and Madrid? If a comparison with other urban areas is needed it would be better to expand it or explain why choosing specific towns.

8) Section 3.3 lines 275-279. This aspect should be discussed in more detail, are authors suggesting that the missing negative charges could be associated to carbonates, like calcium and/or magnesium carbonates? This could be put in evidence looking at the correlation between anion deficit and nss-Ca2+ concentrations as done, for example, in Contini et al. (Science of the Total Environment 472, 2014, pp. 248–261).

9) Section 3.3. line 312. What are IC2.5 and EC2.5?

10) Section 3.3. Line 298-299. This sentence is strange. It is not clear if authors speaks about PM2.5 or PM10.

11) Section 3.3. Line 323. I do not believe that there are anomalous enrichments, there are only enriched or not enriched elements if a single threshold approach is used.

12) Section 3.4. Lines 342-343. The ratio OC/EC is also strongly depending on the measurement protocol used. This aspect should be discussed.

13) Section 3.3. Lines 345-349. The mass closure analysis has been done considering metal oxides and possible contribution of carbonates like done, for example, in Cesari et al. (Environmental Science and Pollution Research 23, 15, pp 15133–15148, 2016) ? The Si concentrations could be evaluated starting from Al concentrations. I believe that some more details are necessary to actually interpret the unaccounted mass.

14) Section 3.4.3 regarding the PAHs risks. It could be useful if the calculated values are compared with typical values found in other areas, see for example, Gregoris et al (Science of the Total Environment 476–477 (2014) 393–405) and references therein.

15) Section 3.6 Lines 471-475. It is not clear why only a few species are included in this analysis and not all measured components. This is a little confusing, I can understand that some species were eliminated in PMF for one reason or the other but it is not clear why the other Figures and Tables reports different groups of species.

16) Section 3.7 line 503. Why it is necessary to add such a large uncertainty? Could this be due to an underestimation of the uncertainties of chemical determination of the different species?

17) Section 3.7 lines 515-516. Mention what is the relative change in Q due to the application of constraints.

18) Section 4 line 567. Better high than higher.

19) Table 2 is not very useful because the detection limits vary for several order of mag-

nitudes and it is not clear which species have low detection limits and which species have high detection limits. I believe that a more descriptive table could be constructed.

20) Table 4. It is not clear the difference between under detection limit and not detected. Essentially not detected for what reason? Because it is under detection limit?

21) The correlation table in supplementary materials is not readable too many small numbers.

22) In table S7. I do not understand the last line with the percentages.

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