

Interactive comment on “High-resolution sampling and analysis of ambient particulate matter in the Pearl River Delta region of Southern China: source apportionment and health risk implications” by Shengzhen Zhou et al.

Anonymous Referee #2

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General comments

The article submitted is suitable for publication in ACP as the topic is within the scope of the journal. This work presents a detailed interpretation of results obtained from a source apportionment analysis of hourly resolved PM_{2.5} and PM₁₀ chemical composition, followed by a health risk evaluation of some metals and the obtained sources. The concept is not novel, but high resolution chemical analysis is not performed as a general routine and the important health issues related to coal combustion emissions in an area of high pollution make this work relevant.

The conclusions are clearly drawn from the work, evidencing the importance of pollution and control and emission abatement, especially regarding industrial emissions and coal combustion in the study area.

The title is appropriate, the article is well-structured and the length of the text is adequate. The writing of the article is in general clear (I am not a native English speaker myself). The abstract is clear and concise, the references given throughout the text are appropriate and the supplementary material appropriate.

The scientific methods are clearly explained in the methodology section. However, I have a remark on the use of gaseous compounds together with particulate matter components in the source apportionment analysis. It is not clear to me if the authors use all components only to draw the chemical profiles of the different factors or if they are also used to determine the mass contribution of the sources to the total PM concentrations. This should be clearly explained in the text, and in the latter case, if gaseous compounds and particulate matter components are used together in the analysis this should be discussed carefully when the contributions of the different sources to PM mass concentrations are discussed.

An important drawback of this study is the lack of the measurement of some major compounds, such as organic carbon (OC), nitrate or ammonium. These are related to the non-determined PM mass in the discussion but it is a pity that they are not determined experimentally. This result in important PM components missing from the database for the PMF analysis, which could affect the results obtained. Regarding this issue, there is a paragraph on mass closure with the objective of defining and calculating RM (remaining mass), which is used as an input in the PMF analysis but I would recommend the authors to add more discussion on the limitations related to this.

Taking advantage of the hourly resolution of the measurements, I think it could be interesting to show some results and add some more discussion on the diurnal evolution of hourly resolved components.

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As the streaker sampler collects PM_{2.5-10} and PM_{2.5} fractions separately, I think it could be interesting to study these two fractions separately, instead of PM₁₀ and PM_{2.5}. Have the authors tried to perform the apportionment analysis with these two fractions?

Specific comments

Page 9, line 5. I suggest the authors to add some discussion on the limitations of indirect calculations. For example sea salt calculated from chlorine could be affected by the volatilization of Cl from the sample.

Page 9, line 17. I suggest the authors to explain better why they use the remaining mass of PM_{2.5} but not that of PM₁₀ in the PMF analysis.

Page 9, line 21. I think more information should be given on the database used for the PMF analysis. The use of gaseous compounds together with particulate components in the same analysis should be explained more carefully as the source contributions are finally calculated to the total PM mass concentrations.

Page 9, line 26. These sources explain 89% and 91% of the PM_{2.5} and PM₁₀ mass. . . I don't understand if the gaseous compounds are included in these sources to calculate the total contribution.

Page 11, line 5. These percentages are not the same as in Figure 4. Please correct.

Page 11, lines 6-9. I suggest the authors to give mass concentration values in the text, as it is useful to follow the discussion. I suggest adding them also to Figure 4.

Page 11, lines 13-15. This sentence is not clear. If CO is associated with gaseous combustion products, it should be also associated with the industrial coal combustion and motor vehicle emissions sources. I suggest the authors to explain this.

Page 11, lines 24-16. It is not possible that biomass combustion is also related to domestic heating or industry?

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Page 12, lines 4-6. The higher evening peak is also possibly related to a more stable boundary layer. I suggest the authors to explain this.

Page 12, lines 7-8. The concentration of the secondary aerosol source seems to be higher at night.

Page 13, lines 8-9. It is not possible that biomass combustion is also related to domestic heating or industry?

Page 14, lines 4 and 6. It seems that there is some confusion between secondary inorganic and biomass burning source, because they are almost the same color in the graph. Please check and correct.

Figure 2. To my understanding the Beta Attenuation monitor is not a gravimetric method and does not provide gravimetric mass. Please correct.

Figure 3. I suggest the authors to add the %species to the profiles

Figure 4. I suggest the authors to add mass concentrations values in the figure.

Figure 9. This figure could be in the supplementary section.

Figure 12. The colors in the figure are very similar for the biomass burning and secondary inorganic aerosol sources. I think this has produced confusion in the discussion. Please check and correct.

Technical corrections

I have not corrected language issues as I am not a native English speaker myself. However I list here the sentences where I find something that should be checked.

Page 2, lines 6-9. Please check verb tense.

Page 2, line 18. PM mass concentration IS considered as the standard metric for protecting human health.

Page 2, line 22. PM1-2.5 is normally used instead of PM2.5-1

Page 2, lines 27-28. Please check verb tense.

Page 3, line 2. Please check this sentence: “is increasingly DEPENDED. . .”

Page 3, line 28. Check word order: “PMF receptor model. . .”

Page 5, line 5. Check sentence: “. . . . was only consisted”

Page 6, line 8. References are repeated, please correct.

Page 6, lines 9-13. I don't understand this sentence. Please check.

Page 8, lines 9-10. This sentence seems unclear, please check.

Page 11, line 16. Please replace , with .

Page 12, line 20. Figure 8 does not show the letters a, b, c, d. Please correct.

Page 13, lines 1-9. Figure 8 does not show the letters a, b, c, d. Please correct.

Page 13, line 17. “Arsenic was observed of the highest risk”. This sentence does not seem correct to me, please check.

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