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Atmospheric Chemistry and Physics Discussions

# *Interactive comment on* "$PM_2$.5 pollution in a megacity of southwest China: source apportionment and implication" *by* J. Tao et al.

**Anonymous Referee #1**

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In this manuscript, Tao et al. presented a study of PM2.5 at an urban site in Chengdu megacity in four seasons in 2011. PM2.5 and its chemical components were measured during the campaign. In addition, the likely chemical formations of ionic constituents have been studied by applying the ISORROPIA-II thermodynamic equilibrium model; and the contributions of several likely sources of PM2.5 have been identified by a widely used receptor model – PMF. Also, the performances of the two models have been evaluated compared with the measurement data. This manuscript addresses the scientific questions that are within the scope of ACP and it is certainly well suitable for this special issue – "Atmospheric impacts of Eastern Asia". These measurement data in this study are complete, providing a valuable dataset for the study of PM2.5 in Chengdu megacity. Both of the measurement and modeling results are significant for



PM2.5 control strategies in Chengdu megacity. However, my major concerns are some conclusions derived from those ratios, and the credibility of the PMF results since the number of samples used in each season is very limited (only around or less than 30). My suggestions are as follows:

Specific comments:

1) P5160, L1-6: "High LG/OC ratio (0.029) and low LG/MN ratio (7.8) in winter ... By contrast, high LG/OC (0.034) and LG/MN (17) ratios ..." I had difficulty to understand these. Please explain how you define the so called "high" and "low". Are there any criteria? If so, please show them in the text. In addition, are those ratios widely applicable? Please clarify;

2) P5160, L14-20: it is difficult to understand how you estimated the contributions of wood burning just from those ratios, please explain it clearly;

3) Figure 7 is interesting. The six sources are derived from the PMF modeling results based on the analysis of certain tracers, so, apparently, those tracers should have good correlations with related sources, if not, the tracer would not be surrogated into the factor. However, the authors are using the good correlations to evaluate the model performance. It is not convincing.

Technical corrections:

1) P5150, L17-19: revise "PM2.5 is a complex mixture of sulfate, nitrate, ammonium, water, organic and element carbon, soil dust, trace elements . . ." to "PM2.5 is a complex mixture of sulfate (SO42-), nitrate (NO3-), ammonium (NH4+), water (H2O), organic and element carbon (OC and EC), soil dust, trace elements . . ." Since those ions are analyzed later, the full name of an abbreviation should be given. In addition, cite the related references for this conclusion;

2) P5152, L4: please cite the original paper of the MODIS AOD product;

3) P5152, L7-9: please cite the reference for this conclusion;

4) P5152, L24: What does “A total of 117 PM2.5 samples and 12 blank samples were collected . . .” mean? Is it “A total of 117 samples in which 12 of them are blank” or “117 valid samples and 12 blank invalid samples”? Please clarify;

5) P5158, L6-16: revise “EPA” to “Environmental Protection Agency (EPA)”, and “HYSPLIT” to “HYbrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT)” The full name of an abbreviation should be given when it is firstly used. Please revise other similar errors;

6) P5158, L15: please cite the original paper for the HYSPLIT model;

7) P5158, L1-6: Since those values have already been shown in table 1, there is no need to write down all of them in the text;

8) P5158, L1-10: some words (such as “even” in line 7 and “highest” in line 10) should be modified. There is no need to use “even” here. Apparently, Chengdu is not suffering the “highest” PM2.5 level compared with other cities based on table 1.

9) P5157, L19: there is no need to give a subtitle named “PM2.5 mass” here.

10) P5158, L20: (Fig. S1) should be (Fig. S2)?

11) P5159, L10: “(Zdráhal et al., 2002)”?

12) P5160, L6-9: please cite the reference for supporting this;

13) P5160, L22-25: any references for supporting these conclusions?

14) P5161, L4: “Andreae et al., 2008” should be “Andreae and Merlet, 2001”?

15) P5162, L16-22: please cite the reference for setting those standards;

16) P5164, L18-19: The full name of an abbreviation should be given when it is firstly used, e.g. SO2, NOx and NH3;

17) P5165, L8: “Dan et al. (2004)” is missing in References;



18) P5166, L16: please cite the reference for this conclusion;

19) P5169, L8: how you define “very well” here;

20) P5169, L11: actually, “10$\pm$10%” is NOT “much lower” than “15%”, please modify the expression here;

21) P5169, L24-L28 and P5170, L1-7: where is the information from? Please cite the related references;

22) P5179, L30: the year is missing;

23) P5188, revise “MODIS” to “Moderate-resolution Imaging Spectrometer (MODIS)”. The full name of an abbreviation should be given when it is firstly used.

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Interactive comment on Atmos. Chem. Phys. Discuss., 14, 5147, 2014.