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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Simulations of Organic Aerosol Concentrations during Springtime in the Guanzhong Basin, China" *by* Tian Feng et al.

Anonymous Referee #3

Received and published: 19 May 2016

General comments

The paper is well structured and the chosen figures illustrate the results well. The description of the methods used is clear. Previous work is clearly described. The main limitation is that the present study presents simulations of 3 days lenght, which does not allow for drawing general conclusions, e.g. for a whole season. I suggest that the authors clearly describe this limitation and make it clear throughout the manuscript, and justify why and how the results are still important. Furthermore, I would suggest to include a small section on how the model performs in simulating meteorological variables that are important for simulating aerosols. This would help be more consistent on conclusions regarding the simulated meteorology. I suggest to revise the conclusions especially with regards to these two points, aiming at consistency with the results

stated in the paper. Finally, I suggest to carefully check the language especially in the introduction of the paper. For further specific comments please see below.

Specific comments

- **Page 2, line 49:** remove complicated
- **Page 3:** the description of the diffferent contributions of OA to PM2.5 is hard to follow, formulate it more understandably; a table summarizing previous results might help
- **Page 3, line 86:** why does the simulation not cover the whole period of the measurement campaign?
- **Page 4, line 89:** OA sources and SOA formation
- **Page 4, line 91:** Specify the research question, investigate is very broad. Also, OA and SOA is not investigated during springtime, but for three days in springtime. Can you deduct general conclusions from a three day simulation for springtime? If so, why? Is the simulated period particularly typical for springtime conditions?
- **Page 4, line 102 and following:** You simulate wet deposition, but you do not present any results on how well precipitation is simulated by the model; or if there even is precipitation. This should be included.
- **Page 5, line 134:** The jump from the boundary condition resolution to the model resolution is big, and I understand that you do not use a nested setup. How far is the studied area away from the boundaries of the domain? Please specify this in the text.

- **Page 6, line 140:** What is the temporal resolution of the emissions? Do you include a weekly and a diurnal cycle to the emissions?
- **Page 7, line 160-163:** This belongs in the section describing the model setup.
- **Page 7, line 166:** Please also mention briefly how the model performs in simulating the observed meteorology, especially those quantities that would influence the simulation of particles.
- **Page 7, section 3.1.1:** Please revise this section, being clearer about what is observed and how the model results compare to the observations.
- **Page 8, section 3.1.2:** Please choose a section title that fits the contents or adapt the contents to the section title. You do not only speak about PM2.5 and EC, but also include AOD and O3. Please also be more specific, e.g. making clear that those results hold for the three days you simulated.
- **Page 10, line 235:** There can be all kinds of reasons for a reasonable performance in simulating O3, PM2.5 and EC, but it does not automatically lead to the conclusion that the meteorological fields are simulated well. You could be clearer on this if you included some results on evaluating meteorology.
- **Page 10, section 3.2:** Is the beginning of this section more suitable for the introduction? A table summarizing previous results would help here as well.
- **Page 10, section 3.2.1:** not remarkable: how big? Specify this quantitatively.
- **Page 11, line 272:** What is observed?
- **Page 12, line 288:** What is the difference between rural and background sites? How are all sites characterized? Please specify this.
- **Page 12, line 308:** What are the results for Mexico City?

- **Page 13, line 320:** Anthropogenic OA contribution?
- **Page 13, line 324:** Again: this holds for the three days you simulated. How is this representative of springtime/the rest of the year? Is it possible to deduct more general conclusions from the simulation of three days, or can you really only say something about those three days? In order to be able to make recommendations for what would be effective mitigation measures, it would be necessary to simulate at least the whole season.
- **Page 14, line 337:** Verify the OA source - what does this mean?
- **Page 14, line 344:** This is not consistent with what you said before; you did not speak about uncertainties in meteorological fields and emissions. Discuss these uncertainties more in the results section.
- **Page 14, line 353:** This is somewhat confusing. You should mention the factor of 10 explicitly in the results section. You only mention the one of Li et al, which is 7.
- **Page 15, line 364:** ... in the simulated period. Discuss the limitations of simulating a three day period.
- **Page 15, line 370:** is 6% not significant? Reword.
- **Page 15** Outlook: you could be somewhat more specific here on what needs to be done. Also, you might include a small discussion on having a more integrated view on the sources of air pollution (e.g. considering different air pollutants etc) and on assessing mitigation measures, and on what is needed to support the design of mitigation measures.
- **Abstract, line 34/35:** The simulation results will facilitate the design of air pollution control strategies in the basis- I am not sure about this. Either you discuss

this better in the conclusions or you remove it from the abstract/rephrase it considereing the points mentioned above.

- **Figure captions 11-13:** Please specify which SOA module was used.

Technical corrections

- **line 39:** fine particulate matter
- **line 42:** aerosol concentrations
- **line 45:** components
- **line 59:** air pollution
- **line 62:** plays
- **line 63:** constitutes
- **line 64:** a severe haze pollution event
- **line 65:** contributed
- **line 66:** measurements
- **line 83:** SOA levels have
- **line 98:** Please order the references
- **line 105:** Please add to references and give link in the references section
- **line 126:** grid cells

- **line 194:** it is not reproduced in Figure 5, but the results are shown in Figure 5; please rephrase
- **line 215:** remove well
- **line 275:** since does not fit here, please rephrase this sentence
- **line 324:** Residential emissions are ...
- **line 357:** might be misleading
- **line 357:** devise?

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