

Interactive comment on “Air quality and emissions in the Yangtze River Delta, China” by L. Li et al.

Anonymous Referee #2

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In this paper, the authors built up the latest emission inventories in the Yangtze River Delta (YRD) region in China and used MM5/CMAQ to simulate the air quality in that region in January and July 2004. It is a valuable study on the emission inventories and the application and evaluation of MM5/CMAQ in YRD region in China. However, there remain some errors and omissions for its final publication. The authors should provide appropriate and strong justifications before drawing any conclusions in the manuscript.

Here are some specific technical questions: (1) The model performance is only evaluated with 10-day's observational data for each month (i.e., January 11-20 and 11-20 July, 2004), which is inconsistent with the simulation period in this study. If the observations are available, please use the whole month's data for model evaluation, which will make the conclusions more convincing. (2) Section 4 is closely tied up with Section

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3.2.3, and the discussions of the CMAQ simulation results should not be separated with the model evaluation. Thus, please combine Section 3.2.3 and Section 4, and re-organize them. (3) Please define the "monthly average". Is that monthly mean of hourly average or 24-hour average concentration of the air pollutant? (4) Please clarify the boundary conditions used in CMAQ simulations. (5) Page 23659, line 21-24. Why are SO₂ reactions related to O₃ formation and destruction? (6) Page 23660, line 2-4 and 11. Please clarify the version of CMAQ used in this study. CMAQ does have a version that couples the mercury chemistry, which apparently should not be the version used in this study. (7) Page 23661, line 1-2. What does "three-way" mean? As is known, CMAQ is one-way nested model. (8) Page 23665, line 2 and 10. Is the NCEP data the real observational data? Is the NCEP data for MM5 evaluation the same set of data used in FDDA? (9) Page 23669, line 21-22. Is this the conclusion drew by the authors? If not, please cite the reference. (10) Page 23671, line 19 and Page 23673, line 20. The authors claim that wind speed is low in winter in YRD region, which is not consistent with that showing in Fig. 7. Please make a justification. (11) Page 23672, line 20-22. There is an omission in your discussions on O₃ chemistry. One important reason for higher O₃ concentration in the rural area downwind should be the titration of O₃ by NO in the urban area with strong NO_x emissions. (12) Page 23674, line 20-22. There are lots of uncertainties in calculating real monthly average concentrations of air pollutants based on 10-day's model evaluation results. Please use the observed monthly average data from the regular monitoring sites if they are available. (13) Please delete the two references that are not cited in the manuscript: Page 23677, line 30, and Page 23678, line 11. (14) In Table 2, are these results calculated for particular grid or an average of each grid at particular time? Please justify why only the data at specific time in 7 days are picked up and showed in Table 2. (15) In Fig. 7, please modify the label of x-axis to the exact date if all the time is 8:00 am, and use the identical scales of x-axis for both two plots. (16) In Fig. 8-11, please modify the label of x-axis to the date and make the legend clear. Though "monitoring average" is represented by the dark solid line showing in the legend, it looks like there are three dark solid lines in each plot.

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Please explain in the manuscript how the monitoring Max., Min., Ave. and model Ave. are calculated at each location in those figures? (17) In Fig. 15, the captions, legends and subtitles are hard to see, and please modify them.

In addition, there are some grammar errors, typos and inconsistencies in the paper. The authors need to thoroughly check the manuscript and improve the presentation in English. Below are some examples: (1) Page 23661, line 2. "the whole of China" should be "the whole China". (2) Page 23662, line 1. "Areas sources" should be "Area sources". (3) Page 23662, line 3. Please define "LPG". (4) Page 23664, line 16-17. This sentence is confusing and please put the data before each province. (5) Page 23668, line 11. "be lower than in reality" should be "be lower than that in reality". (6) Page 23669, line 21. Please define "MRF". (7) Page 23673, line 21. "causes" should be "cause". (8) Page 23675, line 4. "NO₂" should have "2" in subscript. (9) Page 23675, line 8. Please remove "for the first time". (10) Page 23676, line 11. "improve the regional air pollution situation in the YRD" should be "improve the regional air quality in the YRD".

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