

Interactive comment on “Modeling study of PM_{2.5} pollutant transport across cities in China’s Jing-Jin-Ji region during a severe haze episode in December 2013” by C. Jiang et al.

Anonymous Referee #2

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General comments:

The paper give us new idea related to PM_{2.5} transport across cities, especially from Beijing surroundings, the national capital region. The results will help understand and improve air quality problem in one of the most rapid developing area in China and even in the world. I recommend its publications after considering the following comments.

Technical comments:

1. Section 2.2: You wrote “The simulation period was 1-31 December 2013. The time step was set to 300 s, the forecasting time was 48 h, and the simulation began at 00:00

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UTC every day”. As I understand, your model simulation was re-initialized everyday at 00:00 UTC time, based on NCEP reanalysis data, and then run for 48 hours. That means you have one day’s overlap for each run. Probably, your description is not clear or even misleading. Therefore, my questions is, Do you really run your model like this? Or you re-initialized it every day, or using spin-up technique to restart it every day or every other day?

2. Section 3: You mentioned that SMOKE was used to transform your emission data into hourly gridded data require by GRAPES_CUACE model. SMOKE must know what chemical mechanism will be used in the air quality model (AQM) for which the SMOKE output emissions are intended. Here comes my concerns: Do you use modified SMOKE version and did format transformation of emission data? If you use non-modified SMOKE, please give clear information, such as (a) What kind of chemical mechanism used by GRAPES_CUACE? and (2) how many chemical species involved in GRAPES_CUACE?

3. Section 4.3: the formulas of Tans for four directions show that you divide Z direction in seven layers from ground to 3000m, what’s exactly of this definition? Can you give some explanation in your text, and why you define like that? Base on what? Aerosol and/or dust transport layers, wind speed or some other reasons? Also, how did you define your grid cell distance dX, and dY for Beijing area? Based on your simulation domain grid resolution (0.25° x 0.25°) or some other conditions?

Minor comments:

4. Would you mind to add Local Time (LT) to Table 1? Readers have to convert all UTC time when they read your paper. I even suggest you convert all UTC times in your report to Local Time (LT), because your study focused on PM_{2.5} transport across cities in a small region area, readers will easily catch the time when the haze episode(s) happened at local time.

5. As I understand, all measurements are local time (Beijing time), and all model

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outputs are UTC time, but you did not mention that in your text. Please confirm that you converted time to same standard time during comparison.

6. I find word “ca.” (no quotes) shows up in your paper many time, (e.g., Line 8 and 23 on page 3746, “at ca. 900 hPa” and “by ca. 10% per annum”) .Please check them in detail to see if this caused by font that you selected in your word document. I guess the meaning of “ca.” is about or “~”.

7. Line 23 on page 3747: “ as they are an important component ...”, probably should be changed to “as they are important components ...”

8. Please avoid starting sentences with abbreviation that people not familiar with. For example, Line 16 on page 3752: “PK is currently experiencing...” should be : “Beijing is currently experiencing...”. Similar sentences at line 1-5 on page 3751 should also to be revised. I also noticed that you use “PK” instead of “BJ” as the abbreviation of “Beijing” in your whole paper, why not use “BJ”, although I know the reason.

9. Please improve quality of figures 4, 6, 8 and 9. It’s very hard to read them clearly even I zoomed them in five times on my screen. I suggest that your use bigger font size for axis labels and graph legends.

10. It’s not easy to find the “close correlation” (line 7 on page 3752) from Figure 4. would you mind to create a supplementary panel plot including scatter plot with regression line for each comparison. Readers will catch how close correlation between model results and measurements.

11. Lines 24-26 on page 3750: please list station names in dictionary order, which can help readers track text and figures much more easier.

12. Line 8-10 on page 3757: “As the calculation results in Table 1 show, by ca. 2727t from...”. How did you get the value 2727t from Table 1, please explain it.

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