Atmos. Chem. Phys. Discuss., 9, S448–S451, 2009
www.atmos-chem-phys-discuss.net/9/S448/2009/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Evaluation of WRF mesoscale simulations and particle trajectory analysis for the MILAGRO field campaign" *by* B. de Foy et al.

Anonymous Referee #2

Received and published: 27 February 2009

The authors have prepared an excellent manuscript that describes an evaluation of high resolution WRF simulations of Mexico City's mesoscale circulations and resulting transport during the MILAGRO campaign. I have a few substantive questions, but mostly I ask for additional explanatory material in various places. The authors often assume that readers are intimately familiar with MILAGRO and the authors’ previous papers. Readers will find it easier if additional material is added in some the sections that I indicate below.

I recommend acceptance after minor revisions.

Substantive Questions

1) Page 2120–Why do you use one-way nesting instead of two-way nesting? The two way approach is recommended by the creators of WRF and is widely used.

2) Page 2122– FLEXPART-WRF – Was convective parameterization used in both the MM5 *and* WRF version of FLEXPART?

3) Table 1–Model configurations– Why not use the MRF PBL scheme in the WRF simulations as in MM5 (especially in WRFb case [Table 1]? MFR is currently available in WRF although it will be removed in future releases. The YSU is a newer version of the MRF, which has been corrected. Maybe this is answered on page 2122 although it appears the author seeks to keep the model options between the two models "as close a match as possible".

4) Page 2122, Line 1–"and partly because of changes made in more recent WRF simulations". Should "WRF simulations" actually read "WRF releases"?

5) At numerous locations you state that the model "correctly" does something. "Correct" to me implies perfection, and you do not achieve that here. These offending sentences should be toned down because they mislead the reader and are inconsistent with the findings that you present. Specific examples are provided below.

Minor Issues

1. Page 2115, Line 10–" MSL";are your units meters? Line 28–"recirculation" has not been defined yet. Do you mean up the mountain flow that then descent in the heart of the city? 2. Page 2116, Line 18–Are south venting days the same as O3-South days? I suggest that you use consistent terminology. It will make it easier for the reader. 3. Page 2118, Line23–How does "validation of the model" differ from an "evaluation where the potential source fields". If a procedure yields an evaluation of a model's strengths and weaknesses, that would seem to be a validation. Please explain better how you distinguish between validation and evaluation. 4. Page 2120, Line 18–What were the horizontal and vertical resolutions of the GFS input data? I believe 0.5 deg currently is

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the finest resolution that is available. 5. Table 1–It is very common for nests to have a 1 to 3 ratio of grid spacings. However, WRFa goes from 12 to 3 km–a ratio of 1 to 4. Do you foresee any problems with this? If so, please mention them. 6. It would be helpful to include a map containing your three nested domains. For example, the reader does not know where the fine domain is located in Figs. 4, 5 and others. Is it centered over the city or what? These figures also would benefit greatly from a distance scale. 7. Page 2121, Line 8–To me "growth" implies an increase in area over time, but that is not what you mean here. A different word is needed. 8. Page 2122, last line–A better description of the CFA procedure is needed. You give some extra details later and provide a reference here, but at this point in the manuscript, the reader is in the dark about the procedure. 9. Page 2123, Line 22–Why did you work with only 111 out of 124 possible soundings? How did you select the 111 soundings? 10. Table 2–Please define the statistical measures in the Table caption. Some are obvious, but others are not. 11. Page 2126, Line 1– the smaller, coarser simulations have improved indicators especially for moisture transport. Please explain why you believe this occurs. We usually assume that finer (not coarser) resolutions yield improved results. 12. Page 2127, Line 6–Overall, the models are able to represent both the.... This seems a rather sweeping statement based on the statistics you provided. I believe the statement should be toned down–something like, "Overall the models are able to represent many of..." 13. Figures 8 and 13–These figures are so small that it is virtually impossible to distinguish between the three model runs that are shown on them. 14. Figure 8 is interesting. However, have you considered concentration differences as a function of the flow regime? It would be interesting to add a figure like Fig 8 for one species, such as CO, that would show the concentration differences among the three models for different flows. 15. Page 2131–Please define acronyms such as "NCool", "SWarm", etc. These may be well known to MILAGRO participants, but not to others. Also, definitions are not provided on page 2133 for first time usage although they are defined later. Defining at the location of first usage would be much better. Please check to see that all acronyms have been defined at their first usage. 16. Page 2124, Line 9–

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"..the model correctly represents wind transport." This statement is too inclusive. Tone it down. Correct implies 100% perfect; that certainly is not the case here. 17. Page 2138, line 21 you state, "Errors in wind speed and direction are...as large or larger than the standard variation of the data". How can such errors yield "correct" transport when transport is based on the winds? Do the wind errors just happen to cancel out so that "correct" transport occurs? I do not understand this. 18. "Correctly" also is used at several locations on page 2139. I strongly disagree with the use of this word. 19. Page 2122, Line 8–"coarser resolution". The innermost nest of all runs is at 3 km; so "coarser" refers to the outer two nests. This should be made clear.

With a few corrections and clarifications, this will be an excellent and highly informative paper.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 2113, 2009.

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