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Geoscientific
Model Development
Discussions

Interactive comment on "Sensitivity of the Community Multiscale Air Quality (CMAQ) Model v4.7 results for the eastern United States to MM5 and WRF meteorological drivers" *by* K. W. Appel et al.

Anonymous Referee #2

Received and published: 14 October 2009

Review of paper: Sensitivity of the Community Multiscale Air Quality (CMAQ) model v4.7 results for the eastern United States to MM5 and WRF meteorological drivers by: K.W. Appel, S.J. Roselle, R.C. Gilliam, and J.E. Pleim

Due to an increase use of the WRF model instead of MM5, a lot of research institutes and air quality networks need quantitative informations induced by this change. The authors presents a study, based on a previous one, (Gilliam and Pleim, 2009), and more focused on the impact of the meteorology on pollutants concentrations modelled with the CMAQ model. The paper discusses differences between the concentrations

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fields in term of statistical indicators, species per species, and with interpretations on these differences causes. They conclude that the major discrepancies are related to the diagnostic of the friction velocity, u*, the vegetation fraction definition and the predicted cloud cover estimation. The paper may be accepted after some important revisions: mainly, the goal of the study is not clear and, as a function of the most important message to give, new simulations or new analysis are to realize.

Principal Criteria Excellent (1) Good (2) Fair (3) Poor (4)

Scientific Significance:

This paper contains no new concepts or ideas and is more related to an inter-comparison models exercice. The conclusion are related to the structural differences between two well-known modelling systems but not really on the physics behind. The same work with two other dynamical model will certainly lead to different conclusion. It is difficult to highlight if MM5 or WRF is a "better" model for air quality moidelling with these results. The meaning of "better" includes a variety of solutions. Is it to systematically reduce the bias? Is it to ensure a realistic RMSE compared to the surface stations? and their corresponding local representativity? What is the most important pollutant to well reproduce? Is it possible to adjust one with no damage on the other? An "universal" configuration of a meteorological model to be used for air quality modelling doesn't exist.

Scientific Quality:

The modelling tools and applied methods are valid and well used in this context. The work is rigorous.

Scientific Reproducibility:

The two meteorological modeling systems are very complex. A lot of floating parameters and parameterizations are included and the differences between the two sets of results may be due to several schemes, non linearly interacting. If the goal of the paper

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is to demonstrate a model ability to systematically well model air quality, the duration simulations is not sufficient. The authors have to model several years to really see all possible pollution events and thus make realistic statistics. If the goal of the paper is to finely search processes responsible to pollutants concentrations differences, the work must be done more thoroughly. For example, a conclusion is that concentrations are different due to different friction velocity diagnostics. The best way to quantify this impact is to use the same u* for the two simulations, for test. Even if meteorology if non-linear, this would give a first interesting answer on the impact of this parameter on concentrations and, thus, will highlight the relative impact of other parameters.

Presentation Quality:

The work is clear and the conclusions are a good synthesis of all results presented in the paper.

Interactive comment on Geosci. Model Dev. Discuss., 2, 1081, 2009.