

Interactive comment on “Dynamic Adjustment of Climatological Ozone Boundary Conditions for Air-Quality Forecasts” by P. A. Makar et al.

Anonymous Referee #2

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General Comments:

This paper presents and assesses a number of techniques for interfacing regional-scale air quality models of limited horizontal and vertical spatial extent with climatological profiles of ozone used as boundary conditions for the regional models. These profiles extend into the stratosphere, so the corresponding values of ozone are consequently quite high, and care must be taken in specifying these high values as boundary conditions unless the appropriate strat/trop dynamics are modeled well. Regarding that point, it would assist the readers to include a figure illustrating the vertical structures/layering used in the GEMS and AURAMS models, and to the extent that the layer structures differ between the models, how that affects the dynamics and vertical fluxes in the chemical-transport model.

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The various interfacing configurations were described well, and the testing results were presented in a clear and insightful manner. Taking into consideration and normalizing for the difference in height between the climatological tropopause and the GEMS-modeled tropopause seems prudent as far as interfacing with a climatological ozone profile. However, one wonders whether the various methods tested in some way are simply used to balance the errors induced by the deep upper layers used in AURAMS and any dynamic inconsistencies induced by disparate layer matching between the meteorological and chemical-transport models.

Was any consideration given to using potential vorticity as a stratospheric ozone tracer to provide estimates of upper level ozone concentrations above the climatological profile limit?

Specific Comments:

page 13654/line 19 – The North American domain analysis covers the summer 2007 period. Certainly the summer is the time for greatest interest in surface ozone concentrations. However, the exchange between strat/top is at its most dynamic in the spring. It would be interesting to see a similar analysis for that time of year, and whether the results differ from those shown here.

13659/8 – Did the higher resolution case studies use the same model configurations and vertical structures as the coarser resolution North American domain study?

Figures 4,6 – Plots are too small or too busy to discern any details.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 13643, 2010.

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