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Interactive comment on “Impacts of different plant functional types on ambient ozone predictions in the Seoul Metropolitan Areas (SMA), Korea” by H.-K. Kim et al.

Anonymous Referee #2

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Review of “Impacts of different plant functional types on ambient ozone predictions in the Seoul Metropolitan Areas (SMA), Korea” by Kim et al.

This manuscript uses three different approaches to developing biogenic emissions in the Seoul area, then uses those emissions estimates in a chemical transport model. The model is run with a fine grid over the area of interest. They perform a model evaluation, and also show how differences in ozone correspond to differences of emissions.

It is not apparent that there is a demonstrable difference in the performance of the model in a statistical sense. All of the performance metrics are similar.

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The comment “Due to the short photochemical lifetimes of BVOC (e.g., isoprene ~2h) (Atkinson and Arey, 2003), the emitted BVOC from local biogenic emission sources (i.e., PFT area distributions) immediately affect the levels of local surface O₃ concentrations rather than move over long distance.” Should be re-examined in this case. In particular, the way I see they are using the deltas in the regression analysis, they are using each grid independently in their regression analysis, i.e., they use the deltas for each grid (this should be made very clear) in the regression equation, thus the very large number of data sets. There are a number of questions about this. First, such a statistical analysis, and in particular, to infer much in terms of differences and in terms of the significance, should account for the very strong correlations between the deltas in adjacent grids and at adjacent times. Second, a lifetime of 2 hours, and a wind velocity of, say, 3m/s, leads to a distance covered of about 11 km or about 4 grids. The emissions do not fully, or even mostly, react in the grid in which they are emitted. At 3 m/s, on average, the emitted isoprene will be out of the cell in about 10 minutes.

The paragraph beginning with “Meanwhile, we consider that the KORPFT is the representative sources of PFT data. . .” is not clearly stated (do you mean the “most” representative?), highly speculative and either the authors should delve in to this further or remove it. The next paragraph is likewise speculative and should be removed.

The section starting with “Recently, the Korean Ministry of Environment (MoE) promulgated the Special Act on Metropolitan Air Quality Improvement (SAMAQI) . . .” and ending with “. . . the SMA municipal government has to establish the implementation plans (IPs) for air quality attainment for those pollutants across the SMA (Ministry of Environment, 2012a).” contains little scientific content and should be removed. As is, it detracts from the article.

The grammar is in need of much attention, e.g.,: The sentence with “provide important implications to air quality supporting groups” is quite awkward. “Secondly, the MIR scale based OFP calculation may cannot” “obtained were simply rough ones and it may cannot represents” “A global chemistry transport modeling with MOZART-4 (Model for

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Ozone and Related Chemical Species, version 4) reported”

Support and clarification is needed for “As an example, the MEGAN BT was calculated by $80\% \times [\text{broadleaf evergreen trees} + \text{broadleaf deciduous trees}]$ ”

In summary, the manuscript does not really support the use of one approach versus another. The statistical analysis, including the use of p-values and the F-statistics, needs to account for the very strong correlations between values in different grids and at different times. Inter-grid transport of both the primary emissions and secondary products will be very large. The performance evaluation finds little difference.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 24925, 2013.

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