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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Use of North American and European air quality networks to evaluate global chemistry-climate modeling of surface ozone" *by* J. L. Schnell et al.

Anonymous Referee #1

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Review of "Use of North American and European air quality networks . . ." by J. Schnell et al.

This paper documents the ability of global chemistry models to capture a variety of diagnostics extracted from hourly surface observations over North America and Europe. This paper focuses on diurnal and annual cycles, along with air quality extremes. This paper is very well written and I have identified only a limited number of minor issues (listed below). My only major comment relates to the use of the UCI model in this analysis. While it does make sense for the UCI developers to see how their model fares compare to the broader community of models, I have found that very little information

was added to the paper by the inclusion of this model. The discussion on the NOx dependency (Fig. S5) is only marginally useful and only with caveats. I would therefore suggest removing this model, and focus solely on the ACCMIP results, since this is a consistent set of models. A better use of the UCI model results would be to understand better other model biases, but this is not achieved in this paper

Minor comments

1) Page 11372, line 11: "Forces" seems like a funny terminology. "Parameters" seems more appropriate.

2) Page 11372, line 16: The text "the worst pollution episodes in a decade" should be mentioned as only one example of extremes

3) Page 11373, line 9: Change "not-linearity" to "nonlinearity"

4) Page 11376, line 3: How is the regridding performed? Bilinear? Would it make more sense to have a climatology resolution closer to the original model resolution?

5) Section 3.1: unlike the annual seasonal cycle, there is no discussion of range (in the observations and in the model) in this diagnostic? It seems that it would useful to include such additional information

6) Page 11379, line 23: Change "emissions" to "variability in emissions"

7) Page 11382, line 17: It is interesting to note that, unlike many multi-model means, the ensemble mean has actually the largest biases.

8) Page 11393, line 5: this is an interesting statement (on the importance of diurnal cycle in emissions), although it is not clear whether such datasets are available for global (or at least North America/Europe) simulations. It would be good to point the reader to such datasets if they are available

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