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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Air quality simulations for London using a coupled regional-to-localmodelling system" *by* Christina Hood et al.

Anonymous Referee #1

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General comments:

The paper addresses relevant scientific questions within the scope of ACP. The authors do not clearly support to present novel concepts, ideas, tools, and data, but they are applying integrated model approaches to investigate regional and local AQ. A thorough comparison among the approaches is given. The overall presentation is well-structured and clear; some insertions are proposed below. Some typos and grammar issues noticed should be corrected after the final revision by the authors.

Specific comments:

Abstract: General introductory phrases should be avoided. Instead, more results

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Discussion paper

should be present. Introduction: A more extensive review (and references) is proposed with respect to the regional and urban models (p. 2 line 20 and on).

P2. Lines 29-31: The use of boundary concentrations from measurements for model applications has limited applicability not only for future applications but also for diagnostic runs due to several reasons: temporal analysis of measurement data (if not hourly), and mostly, adequate spatial information in the area of interest.

Sect. 2.2: The wide use of EMEP model should be supported by references (p3, line 28). Which is the simulation period of this model? Please provide the simulation domain using coordinates, as well (mainly for reproduction purposes).

Lines 3-4: The 1st vertical layer seems quite deep. Where do you base such a choice? Can you support this height for your region?

Line 8: please provide reference(s) for the VBS scheme you use.

Lines 5-12: which is the size distribution of aerosol species within the regional model?

Sect. 2.3: Some important information for the city scale model is not given. i.e. which are the simulated pollutants (chemistry, sizes in case particles)? Which spatial criterion (coordinates) defines the simulation domain? Which is the simulation period of this model? which is the temporal resolution of the simulations/outputs?

The way/method used to provide ic/bc conditions to the city scale model is not described (pollutants, spatial distribution of used stations, temporal resolution etc).

Sect. 2.4: the coupling method is quite unclear. Despite based on a previous study, it is better briefly described shortly here as well.

Lines 17-18: unclear. Please rephrase

*it may be helpful to provide a table with the model applications used (incl. emission scenarios), for each purpose.

Sect. 3: the justification with respect to model errors is not quite understood (lines 16-21)

Sect 3.2: not knowing the simulation period, it is a question how the annual average is calculated (e.g. from representative simulation events?)

Sect. 4. I would rather prefer a balance between evaluation results and AQ results for the area of interest. At the moment, mostly the model performance is discussed rather than AQ issues.

Tables are quite many in number. Consider either merging those with similar information or moving the less important to the Appendix.

Some issues on the figures to be corrected:

Figure2: the quality of the figure seems poor.

Figure 4: the mass emission rates are not pronounced on the map.

Figures 5-7: the information on the model (system) used to produce these outputs is omitted.

Figure 9: the figure is poorly described in the legend. Bear in mind that each figure should stand alone.

Figures 10- 11: the axis numbers of the middle plots are on top.

Figure 12: axis titles are duplicated.

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