

Interactive comment on “The impact of urban land-surface on extreme air pollution over central Europe” by Peter Huszar et al.

Anonymous Referee #2

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General comment:

Overall, I think this is an interesting piece of work, and evidently there has been a lot of time taken to use different models, and model setups, which provides an informative comparison. I think by looking at the extreme values (5th & 95th percentiles) the authors highlight the importance of the “extremes” and the way in which they can impact air quality, rather than just looking at the mean – something which could be of use to local authorities. I think they show the impact that urbanisation can have on air quality, and which meteorological variables can further enhance this during high pollution episodes. A few things need further explanation in the methods section (described below), and I think the discussion / conclusion section needs more refining. In particular I think that there should be some mention of a comparison between overall model per-

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formance over the region. In the conclusion I think an overarching statement relating back to urban land surface / air quality would be helpful to highlight the importance of this work. There is also a problem with text size on all figures, these will have to be plotted again as they are far too small. Also, it would be helpful to have lettered/numbered plots to help make figure captions clearer. I think if these things are cleared up, I am happy to recommend this paper is accepted for publication in ACP.

Specific comments:

Page 1, Line 4: Most of the studies – makes it sound like you mean the model setups you have just described. Make this clearer that you mean studies from the literature.

1,10-14: Values helpful but percentages could help with contextualising values.

1,11 modeled -> Modelled (this is first noticed here, but occurs multiple times throughout).

2,39 know -> known

2,46-47 Sentence doesn't read well "The second influence can on the other hand". Consider rewording.

5,153 – Model setup section. There is very limited information on the domain in which you are running. I know it is central Europe, but more information should be provided. Maybe a plot showing model domain with each nest location (very common plot when running multiple nests) would be helpful here. This could also give you an opportunity to show the locations of the 4 major cities you focus on.

6, 160 – "about" / "around" seems vague. I know this varies across time, but a more quantifiable description would be helpful given that the bottom model layer is of importance in this study.

6,190 – Perhaps I couldn't see this, but there is no information given on the resolution of the anthropogenic TNO MACC-III emissions/ high res Czech emissions. What

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constitutes high resolution? You are running 3 domains at high resolution but what resolution is the emission data feeding these domains? More information is needed here.

7,215 – “In THE case of WRF-Chem”

7,218 – You say that you think the overestimation is associated with a size-limited network of monitoring stations which cannot resolve local variations – how much is this effecting it? If you are using this as your explanation, why use these regridded observations at all. Can you get the individual station datasets and compare with these instead? Therefore, removing the issue of interpolation/regridding?

7,235-243 – PBL height comparisons. Are you comparing like for like here? PBLH is often calculated differently across models. Information on how the different models calculate this might be helpful

10,307/8 – Why are one set of results from the 1km domain, but all others from 9km domain.

18, 562-570 – I feel like more needs to be added to the discussion & conclusion, especially in regard to individual cities which are mentioned in Table 2-6 and in the results section. The discussion section isn't specific enough and talks about the variables (both meteorological and chemical) overall, despite large differences over the total domain. There are no concluding remarks about the different models.

31, Fig 1 – There might be some issue between the boundary conditions and the outer nest? There seems to be a “border” of higher values around the 2 most right plots (4th column). I have seen this myself when plotting WRF-Chem results and I think (can't remember 100%), but this may be to do with you plotting values outside of the actual modelled domain.

31, Fig 1 (continued) – Text size is far too small. Cannot read the title, lat/lon values or colour scale values. I would consider labelling each plot (a-h for example), because

referring to plots by upper/lower row, 1-4th column is not ideal. Also consider titling each row.

31, Fig 2 – Similar to above, text on plots far too small. Cannot see without significantly zooming in. Again, I think labelling individual plots will make the figure caption easier to understand. At the moment it is hard to follow.

32, Fig 3 – Same as above.

33, Fig 4 – Title size good here!

34, Fig 5 – Image Text size far too small again. Where you say shaded do you just mean where there is colour plotted? I.e. Where the plot is white = not statistically significant? I think the word shaded might need to be changed.

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