

## ***Interactive comment on “Modelling the dispersion of particle numbers in five European cities” by J. Kukkonen et al.***

**Anonymous Referee #1**

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The authors present an overview of the modelling of particle number concentrations (PNC) in five cities in Europe. The simulations have been performed on a regional scale with the LOTOS-EUROS model and on a local scale with different local models for every city. Model simulations focus on the years 2005, 2008 and 2020. The simulation results of the regional and local models were compared with measurements of the year 2008.

From the current version of the paper it is very hard for the reader to assess the main result of the paper, i.e. the five maps of UFP concentrations for the different considered European cities, because the reader does not have enough information about the difference between the local models and the input of the emissions. We simply can't see and understand what is driving the differences between the results for the differ-

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ent cities, and how important these differences are. In our opinion the paper therefore needs major revisions in which the material should be structurally re-organised such that the material is presented in a more uniform way. We recommend that the authors consider the following points:

- in the description of the urban-scale emission inventories (2.2.2) there should be more emphasis on the major differences and similarities between the inventories. Are the differences such that the output of the maps for the five cities can be objectively compared or are there serious omissions in some of the inventories. For example the inclusion/exclusion of harbours and airports, 2 important sources next to road traffic.
- in the description of the urban scale dispersion modelling (2.3.2) the major differences and similarities should be explained. Again, as above, the questions is whether the differences between the models are such that the output of the maps for the five cities can be compared in a meaningful way.
- can the authors indicate whether the uncertainties in the presented maps from city to city are due to the used emission inventory or due to the local model which was used.
- the authors show that the correspondence between measurements and calculations for the LOTOS-EUROS model still needs some significant improvement. In our opinion it is therefore not very meaningful at this stage to present a future scenario for 2020, Instead, we suggest that the 2008 map of LOTOS-EUROS is presented in figure 7, such that the same year is used as for the local calculations (figure 8).
- make the figures of the city maps uniform (figure 8), ideally use the same visualization tool, it is the 'heart of the paper'. Choose a scaling which is 'smart' such that the five panels can easily and meaningfully be compared. Indicate locations of airports and harbour areas (or other significant local sources) in the maps where appropriate.
- In figure 9 the results should be presented with for example stacked bars, such that the reader can see which part of the modelled concentration is from the LOTOS-EUROS

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model, and which part is from the local model.

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