

***Interactive comment on* “Evaluation of very high-resolution simulations with the non-hydrostatic numerical weather prediction model Lokalmodell for urban air pollution episodes in Helsinki, Oslo and Valencia” by B. Fay and L. Neunhäuserer**

Anonymous Referee #1

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General comments

This is a detailed, well written paper that describes the application and testing of the DWD LM NWP-model at three different grid resolutions and for three different cities for a number of episodes. The scientific question addressed in the paper is whether grid refinement improves model performance and whether the model is capable in

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simulating the meteorological conditions under rather extreme episodic conditions.

In the paper it is convincingly shown that in nearly all cases the fine scale model version, down to 1.1 km, shows a better model performance than the larger scale versions of 7 and 2.8 km. This improvement is caused by the more detailed orography and land use data as input to the fine scale model. Model parametrisations have not been changed going from the larger to the finer grid scale.

The study also shows the difficulty that the LM has to simulate strongly stable conditions. Hints are given for possible model improvements to overcome these problems; the soil scheme, the surface layer parametrisation.

The paper is a valuable contribution to the understanding of the capabilities and restrictions of current NMP models.

Specific comments

Improved atmospheric dispersion modelling is mentioned in the paper as the final aim/focus of the study, with emphasis on near realtime forecasting. Although it is clear that NWP-models like LM are needed for forecasting of air quality, "chemical weather", the question that arises reading this paper is whether NWP as meteorological input to chemistry transport models is also the best choice for general air quality assessment, evaluation abatement strategies etc.

Next to prognostic NWP models, also diagnostic modelling is still in use, focussing strongly on the use of observations and creating fields by for example optimal interpolation. It should be noted that for numerous air quality model applications still observations and diagnostic meteorological input is used. Diagnostic models - by definition - will in general deviate less from observations than the NWP models.

It might be of interest to try to define for which applications prognostic, and for which applications diagnostic meteorological modelling should be used.

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Some minor points

The vertical extent of the lowest layer for the 35 and 45 vertical layers is of interest to know. Are the model results given the average over this lowest layer. So, is the T2m in fact the average over the lowest layer of say 10 m ?

It is stated that all episodes in this study are local-emission episodes. The questions arises whether this is an assumption, or really proven. In the case of Valencia most of the O₃ will be caused by further away emission sources. A similar item is the frequently used wording of “resuspended particle episoded” or “suspended dust”, or also road dust resuspension by studded car tyres. The fact is that high concentrations of PM 10 (?) are observed, but that the reason might well be not , or at least not only, resuspension but wood burning for eaxmple. Also the word resuspension might be confusing, meaning in fact re-entering of already deposited particles back in the atmosphere by wind.

It is stated, on page 7, that with increasing resolution and detail of the simulations, the probability of larger model deviations increases. The argument might also be, assuming the station is representative for the smaller scale, that the deviations might decrease, as is also partly shown in the paper.

The discussion on page 15, in the middle, about using a factor 5 to 10 is unclear.

Technical comments

Pag 1. 4 e line, leave out the second “without”.

2 e line from below: physiographic\

Pag 9 under 3.2.1 91 m should be 90 m ?

Pag 12 10 e line from below week should be weak

Pag 14 6 e line from below for pollution dispersion “in the resulting concentrations” and thus..

Between “ ” should be skipped

Pag 18, 11 e line “unusual and unusually poor” is a bit strange

Pag 19 18 e line a few kilometers although should be kilometers apart although

Pag 22 12 e line from below discussed in stead of dicussed

Pag 23 2 e line of instead of off

Pag 25 13e line meteorological

Pag 26 11 e line from below and instead of amd

Pag 27 4 and 5 e line forecasting episodes

In table 3 pag 34 LM 1.1 km Valle Hovin is 916 correct, or should it be 91.6 so 92 ??

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 8233, 2005.

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