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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Turbulence-permitting air pollution simulation for the Stuttgart metropolitan area" *by* Thomas Schwitalla et al.

Anonymous Referee #1

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The paper treats an interesting topic, is clearly structured and offers no significant language problems. With the paper being comparatively short, a lack of detail exists with regard to a more detailed presentation of the related processes, when it comes to the assessment of the interactions between meteorology and air chemistry. The introduction is relatively long compared to the most import aspects highlighted in the title of the paper which is air pollution modelling.

Referring to e.g. line 225-232, air quality has not been evaluated due to the temporal mismatch of emission data and modelling time. Quickly checking on the publicly available observations for the studied locations, I do find the model capable of representing actual conditions at least for NO2 and therefore would add a chemical evaluation respectively, for the sake of completeness. With regard to NO2, you even indicate an

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overestimation of various peaks. That aspect will be addressed later.

Please further try to improve the statements on the added value compared to other studies existing for resolutions 1-3 km, for that particular area. For instance, past model approaches usually massively underestimated surface levels of pm10 due to various reasons. Due to the high resolution emission however, your system tends to improve that aspect. Please comment on this.

When using these kind of models – this has been mentioned in the introduction and conclusion – one might be interested in the forecast of pollution thresholds. Please comment on the point, how suitable that model system would be for actual applications, also comparing with other model systems with that purpose such as PALM-4U. Please provide more details on the added value of your system and also provide some insight on the computational costs, which might be an important information for a potential end-user. With that regard, please provide a synthesis of planned efforts, how that system could be transferred to operational use and if that is planned at all.

2.1 With decisions mostly being based on near surface concentration, how does the lowest model level of ∼15m addresses that aspect?

4. In order to get a more complete impression of the robustness of the model results for being used in urban areas, it would be interesting to include actual urban stations in the evaluation process.

Line 308: adding a central urban location would be interesting here

Figure 9: provide more details on the related processes here, especially on the reasons of the temporary increase @IPM and airport at about 4:30

Figure 11: The naming of the figures according to their location seems to be in the wrong order here. With the high vertical resolution being applied in the model, it would be interesting to see a comparable image for the observed potential temperature as well here.

Figure 12 nicely shows the potential of the high resolution, but a hint towards the observed quantity would be an added benefit.

Figure 13: While NO2 remains fairly static over the traffic areas, PM10 strongly accumulates in the north eastern part of the domain. Please discuss the reason for that.

Figure 14: highlight the cross section in one of the figures above. Further a large part of the figure is covered by the topography. Due to that, a lot of information gets lost for the most interesting areas in the lower urban boundary layer. Please modify the figure accordingly, to see what is going on under the arrows.

Figure 5: As mentioned earlier, it seems that the model is well capable of representing realistic conditions at least for the urban background. With regard to NO2 it even overestimates the peaks. Please add respective information

Line 405: What is the reference to this exceedance?

Line 424: unclear what exceedance you are referring to here.

431-434: That aspect is not clearly visible from the mentioned figures.

With regard to the project description 'OpenForecast': How open would that system be for local stakeholders and would it be capable to be used for actual decisions. Please briefly comment.

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