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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Future air quality in Europe: a multi-model assessment of projected exposure to ozone" *by* A. Colette et al.

Anonymous Referee #2

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General comments

This paper is concerned with the exploration of near-future air quality (2030) and impact assessment by means of ensemble chemistry modeling. The paper addresses the uncertainties and robustness of the projected changes in air quality and risk assessment. Overall, the work presented yields interesting results on the field of future air quality over Europe, with emphasis on assessment of exposure to ozone. The methodology of the research is robust, since several well known models (BOLCHEM, CHIMERE, EMEP, EURAD, OSLOCTM, MOZART) are used to build the model ensemble, a state-of-the art emission inventory is applied and 10 year long simulations were performed. The presentation of the material is clear and well structured and the writing concise. I would suggest publication in ACP after some corrections and additions are applied to

the current manuscript.

Specific Comments

P 14777, L25. ".. we can use present-day meteorological conditions to drive the CTMs". Could you please clarify? To my understanding, the decade of 2030s was simulated in the current work, using the two GEA emission scenarios (reference and sustainable) projected for the 2030s, but what about the meteorology? If not a relevant time slice (2030s) from a downscaled GCM was used for all models, which present day conditions were used? There is not so direct information in the text, therefore, you necessarily, need to elaborate a lot more on the meteorology used for the simulation and put forward a well argued case to justify your choice to use meteorology of different time-slices – if this is the case.

Please, make sure you consider the following points:

The Ozone chemistry and thus the calculated exposure metrics are sensitive to the external meteorological forcing, therefore it would be nice to know about the range of variation of meteorology that forces the ensemble models. Preferably, a paragraph entitled meteorology, should be added in the current manuscript, to describe the meteorology used.

You mention that "The 2030 time period has also the advantage for air quality modeling that the climate signal is relatively weak, so that we can use present-day meteorological conditions to drive the CTMs". This is true, however, there is a climate change signal, in some cases appearing to be statistically significant, and it does definitely affect surface air quality, even to a small extent. This direct impact of climate change on air quality is lost, if not a relevant meteorological time-slice is used (2030s). The latter is acceptable, however, it must be pointed out that you investigate the impact of only future emission changes on air quality.

This could be an addition to the already published work investigating solely the climate

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change impact on air quality, leaving emissions unchanged. You could discuss findings of both studies and comment on their findings, which signal is the stronger, whether they mask or add to each other depending on the region.

It would be nice to even mention shortly the chemical boundaries used in the models and their variability, so that the reader has a direct access to information.

P 14781, L20-22. The evaluation performed in the CS2011 is certainly indicative of the robustness of the modeling systems used, however, the current modeling set up is somewhat different. Therefore, it is strongly suggested that you add some more material with respect to evaluation. This could be a table with simple but representative statistics of model performance e.g. error, bias, correlation coefficient. Since model resolution is 0.5 to 0.22 only rural stations could be used for the evaluation metrics

P14784, L3. Differences in O3 concentrations can be also seen over the Mediterranean. How do you account for that?

P14784, L20. What exactly is meant by “marginal”? The increase of O3 in the Benelux area for the sustainable scenario seems to be more than 5 ppb, which is a lot.

P14787, L6. Could you explain how this choice has been made? Based on previous experience, or that simply gives best results? (Referring to the choice of a different EMEP model level than the surface, if I get that correctly).

P14792, L6. Does ‘significantly’ mean that you perform a statistical test? If not, better not using this word.

Technical comments

Figure 4. Rearrange the panels so they are presented in order. P14784, L15. Better to remove the world “globally”

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 14771, 2012.