Response to Anonymous Referee #1 for "EURODELTA-Trends, a multi-model experiment of air quality hindcast in Europe over 1990–2010" submitted to GMDD by Colette et al. 2016 as gmd-2016-309

Note: Referee comments are indicated in bold, answers are in regular font and changes highlighted in yellow in the revised manuscript

General comment:

The manuscript provides detailed information of the experiment set up. The experiments look reasonable. However, it is very difficult to understand the anticipated results based on the current information. As described in the journal website, results should be provided for model experiment description papers. (http://www.geoscientific-modeldevelopment.net/about/manuscript_types.html#item4) ***"Should include sufficient descriptions/figures of model results to give an overview of the project."*** **However, the manuscript does not provide any results. Without results, it is not easy for referees to provide further meaningful comments on the experiments.**

In excluding model results from this experiment description paper, we followed the example of several recent articles of this category published in GMD for the Climate Model Intercomparison Projects (CMIPs). After further discussion with the topical editor, we understand that those were exceptional, and since the Eurodelta-Trend exercise is mature enough to include such sample results in the experiment description stage, we are pleased to address the referee's concern (also shared by referee #2) by adding a new section "Sample results". As explained in that section, we present some quickviews of the model ensemble. The evaluation of the ensemble and its ability to capture air pollution trends is one of the stated objectives of the experiment, it requires however a substantial analysis which will be the focus of forthcoming papers.

Specific comments:

Line 12 in page 3: the "(" should be removed.

Parenthesis removed

Line 39-40 in page 3: the sentence is not completed.

Sentence rephrased

Line 32 in page 6: what does the "perfect" mean? I assume the authors refer to "better".

In the regional climate modelling community (EuroCordex), boundary conditions originating from reanalyses are sometimes referred to as "perfect", in opposition when global climate model free-runs are used for historical periods. Since we are not really in that context here the word "reanalysis" is used now.

Line 34-35 in page 8: What is the reason to rely on observation-based boundary for most experiments?

Both approaches have pros and cons. The reason why observation-based boundary conditions were selected is the result of a consensus discussion in the modelling group concluding that the balance between pros and cons was in their favor. A choice had to be made to minimize the number of required simulations, even if we kept

sensitivity analyses with the model-based boundary conditions. The text has been revised slightly to explain that better.

Line 18 in page 9: The ammonium trend based on NOx is not necessary true, as NH4 is also affected by NH3 emission which is expected to maintain at a constant level in the future, while NOx is expected to reduce.

The reviewer is right to point out the uncertainties related to those trends. The results of the experiment are expected to address some of those points. Such uncertainty in the trends of the boundary conditions will certainly require further attention in the analysis. The sensitivity experiment using model-based boundary conditions will be used in that perspective. But, as far as observation based boundary conditions are concerned, we used the standard procedure used in EMEP modelling (Simpson et al., 2012). A sentence has been added at the end of the section to highlight those uncertainties.

Line 34 in page 9: "The air concentration" should be "The air pollutant concentration".

added

Line 18 in page 12: The referee cannot agree this requirement based on two reasons. First, if users use the data, they should cite the corresponding publications. This should provide enough credits for the authors. Second, the findings of other studies may not be agreed by the authors. This may not be appropriate to include the authors' names on a paper that has findings against the authors' understanding. Therefore, this requirement should be modified such as "users of these data should cite this paper".

The present publication is a description of the experiment. We expect several forthcoming publications regarding model evaluation that need to acknowledge the work of contributing modelers. It should be stressed that the Eurodelta-Trends policy states that co-authorship must be "offered" to modelers, which keep their right to withdraw their names from an article they would not approve.

Other updates

The table of contribution of each modelling group to the various tiers has been updated to include new deliveries since the date of submission of the first manuscript. A problem has also been uncovered in WRF-Chem simulations, so that only an update of tier 1 is available for the updated contribution, while other tiers are now indicated as "planned".