

Interactive comment on “Curriculum Vitae of the LOTOS-EUROS (v2.0) chemistry transport model” by Astrid M. M. Manders et al.

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We thank Dr. Rouil for her valuable comment, that contributed to the quality of the revised paper. The response to her comments is below in Italics.

The idea of a curriculum vitae for the LOTOS-EUROS model, which is one of the most famous and efficient chemistry-transport model in Europe is very interesting and welcome in this period when, as mentioned by the authors such models have reached a certain level of maturity. The article also introduces some history about the development of air quality models over the twenty past years which is also well documented. As a general comment, we have here a good and relevant paper. The main added-value of this paper is to explain the history of a chemistry-transport model like LOTOS-EUROS, the drivers that led to the current open-source version, the current and future challenges. In that perspective it would have been interesting to get more details about the merging process between both initial models LOTOS and EUROS. EUROS is briefly described compared to LOTOS and how the Dutch teams managed to get only one model is not really explained although this is a quite original approach. For instance, it would be relevant to know how the experts selected the model parametrizations, etc ., (in paragraph 2.1).

This is a good point. The merging was quite a pragmatic process in which LOTOS was used as a backbone for the structure. Many of the parameterizations were quite comparable between the models, and where EUROS had a more advanced scheme this was included (in particular POP and deposition). A brief remark was added to the text.

I understand the authors decided to tell a story avoiding equations describing more in detail the model (this is not a peer-reviewed model description). This choice is valuable to focus on the model development strategy, but as a consequence, some parts of the paper may remain a little unclear for non experts readers (reference to EnKF method and VBS model in paragraphs 6.1 and 6.4 for instance or the paragraph on emissions modelling -6.3- which may be confusing for someone who did not understand that emissions modelling is a part of the CTM).
Brief explanations on VBS, EnKF and emission modelling were added to the text

Also, the discussion on high resolution runs (page 22) is relevant but not conclusive (finally is the combination of LOTOS-EUROS and OPS the most promising approach? added value of the plume-in-grid?) I would recommend to review those paragraphs and to amend them with few more explanations.

The present OPS-LOTOS-EUROS coupling is a useful product for specific applications, but does not fully exploit the possibilities of a more advanced plume in grid approach. This is added to the text.

This paper is pleasant to read for air quality modellers who share the authors' concerns and philosophy but may be more difficult for people outside the field. It is mainly due to the fact that a number of references and definitions, useful for good understanding, is missing. I have noted the following terms used without any explanations: GEOSS, PoDY, Ensemble approach, NOy, SDS-WAS and some references to models: HARMONIE, COSMO, VBS, OPS... few words to introduce them are necessary

*Clarifications were added for GEOSS, PoDY, SDS-WAS, VBS, HARMONIE and COSMO, OPS
The meaning of ensemble should be clear from the context.*

Please note that schemes provided on figure 2 are very difficult to understand, and for this reason are almost useless. It is necessary to revise and simplify them, making the acronyms more explicit and focusing on the key messages those schemes are supposed to bear. The other figures are correctly chosen.

We agree that Figure 2 may contain too much detail for the general reader. It was drastically simplified, thereby better highlighting the natural cooperation between RIVM, KNMI and TNO as model consortium partners. In addition the aspect of data assimilation is now illustrated more clearly.

I would just recommend to add, if possible, a representation of modelling fields or their performances with assimilation of satellite information. This aspect is well discussed in the paper but not illustrated.

We feel that Figure 6 demonstrates the impact of data assimilation (albeit with ground observations) quite well and its caption has been extended to give more information. Adding another figure on data assimilation would give the topic too much weight for this paper.

A good point is the extensive bibliography provided. However, I would recommend to add a reference (for example page 4 line 15 with Menut et al. 2013) to the last peer-reviewed paper related to the evolutions of the CHIMERE model (<https://www.geoscimodel-dev.net/10/2397/2017/>).

The reference is added

Here are a number of typo corrections I noted: - Page 3 line 16 a parenthesis is missing after 1972; - Page 16 line 31 "months" instead of "mont", - Page 21 line 26 a dot is missing - Page 22 line 17, add a "s" to "application", - Page 22 line 18 "from" instead of "form", line 19 add a reference for HARMONIE and COSMO (at least institutes that develop them), - A number of times in the text PM10, PM2,5, NO2 or NOX are written without indices - Check the References to "Collette", the correct name is "Colette"
These and several other minor textual corrections were made