

Interactive comment on “European anthropogenic AFOLU emissions and their uncertainties: a review and benchmark data” by Ana Maria Roxana Petrescu et al.

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Received and published: 18 February 2020

The authors thank Referee #1 for the thoughtful and helpful comments and for the fact that the reviewer acknowledges the manuscript as being a comprehensive collection of data, very useful for the modelers and the whole scientific community. In the revised version we implemented the suggestions regarding the structure of the metadata and information on data sources.

General evaluation:

This study is intended to be annually updated, similar to the GCP papers (Friedlingstein

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et al., 2019), to evolve into a complete synthesis of bottom-up and top-down GHG estimates of European countries and ecosystems. While the GCP provides the global carbon budget, this study starts a series of datasets for EU. These are essential for the GHG Monitoring and Verification Support (MVS) capacity, the EU envisages to build in support of the enhanced transparency framework of the Paris Agreement. The European Commission decided to take up under the long-term Copernicus a new service for monitoring anthropogenic CO₂ emissions, which is under construction (Janssens-Maenhout et al., 2020).

While quantitative estimates of uncertainties are, at this stage in the project, only available for UNFCCC and EDGARv4.3.2, we agree that more is needed to evaluate the validity of the model results and between various data sources. We will, therefore remove the word “uncertainties” from the title: “European anthropogenic AFOLU greenhouse gas emissions: a review and benchmark data”.

Regarding the wording and the use of “benchmark” term in the title, we strongly believe that this compilation of available data extends significantly beyond what was presented by any other publication, for AFOLU and also for Europe. Therefore, any future quantification of AFOLU GHGs in Europe will need to consult this dataset as a benchmark to compare their own result to – especially given our intent to continuously update. Similar exercises in other world regions could also use this as a valuable basis for comparison. Hence we propose to keep the word benchmark in the title.

The data uploaded on the initial zenodo link <http://doi.org/doi:10.5281/zenodo.3460311> represents the data behind the figures, it ensures easy replicability. We updated the link with <https://zenodo.org/record/3662371#.Xkui-WhKjIU> and, next to updated figure files, we added as well the original files “metadata_” of public databases (EDGAR v4.3.2., FAOSTAT and UNFCCC NGHGI 2018). CAPRI and CBM original time series are provided as well. For the rest of the data, the co-authors would prefer to be first contacted in line with their data policy (see contact details in Appendix A, Tables 1A1 and 1A2 extra column providing the Emission Data availability) before providing their

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full times series (H&N, EFISCEN, GAINS, TRENDY v6, BLUE).

Regarding the description of the datasets, this is located in Appendix B, where we describe each source and where we added information on spatial resolution, time steps and we updated as well the data in the excel sheets to ensure a better readability as suggested by the reviewer.

Response to specific comments and changes in manuscript:

We attached online to the response the revised manuscript highlighting in yellow all the changes as responses to both reviews. Please note that the line numbers changed. We refer below to the line numbering from the first submission version you kindly reviewed. Line 76: yes, it is true that the base year differs for some countries, therefore we added a footnote no. 3 with the following explanation: For most Annex I Parties, the historical base year is 1990. However, Parties included in Annex I with an Economy in Transition during the early 1990s (EIT Parties) were allowed to choose one year up to few years before 1990 as reference because of a non-representative collapse during the breakup of the Soviet Union (e.g. Bulgaria (1988), Hungary (1985-87), Poland (1988), Romania (1989) and Slovenia (1986)). Line 77: we removed the term year-2 from the main text Line 150-155: We added a sentence in the manuscript Section 2, line 150, stating that the reason for choosing these datasets was: "The collection of data represents the latest data available and most recent state of the art of available estimates of GHGs representing the AFOLU sector in Europe as derived from our knowledge of the scientific literature, the scientific networks in Europe." We explain as well in the Conclusions, that the following synthesis will include data produced under the VERIFY H2020 project, where most of the modeled data presented here, will be again analyzed. We expect this to continue also after the VERIFY project has formally ended into the Copernicus CO2 service that is currently developed (Janssens-Maenhout et al., 2020). Table 1: We added a line for each gas to better separate between the three sections. Line 420-425: Thanks for reminding us of this inconsistency. We changed "kton CH4" into Mg CH4. In brackets we added the Tg corresponding value. Line 450:

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removed "And" Figure 13: on the new zenodo link we added the excel sheet with data belonging to Figure 13 as well as for Figure 1. Footnote 6 (now 13): is corrected Table B2: We inserted the explanation for uAD and uEF. The confidence interval is 95% and is mentioned in the paragraph below Table B2. Appendix B data source descriptions: we added, whenever available, information on the time step of the models.

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Janssens-Maenhout, G., Pinty, B., Dowell, M., Zunker, H., Andersson, E., Balsamo, G., Bézy, J.-L., Brunhes, T., Bösch, H., Bojkov, B., Brunner, D., Buchwitz, M., Crisp, D., Ciais, P., Counet, P., Dee, D., Denier van der Gon, H., Dolman, H., Drinkwater, M., Dubovik, O., Engelen, R., Fehr, T., Fernandez, V., Heimann, M., Holmlund, K., Houweling, S., Husband, R., Juvyns, O., Kentarchos, A., Landgraf, J., Lang, R., Löschner, A., Marshall, J., Meijer, Y., Nakajima, M., Palmer, P., Peylin, P., Rayner, P., Scholze, M., Sierk, B., Veeffkind, P., Towards an operational anthropogenic CO2 emissions monitoring and verification support capacity, accepted for publication in *BAMS*, doi:10.1175/BAMS-D-19-0017.1, 2020 forthcoming

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