

Interactive comment on “The consolidated European synthesis of CH₄ and N₂O emissions for EU27 and UK: 1990–2018” by Ana Maria Roxana Petrescu et al.

Anonymous Referee #1

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The authors present a comprehensive synthesis of CH₄ and N₂O emissions over Europe from 1990–2017, and Near Real Time estimates from EEA for the year 2018 was used as a supplement. The data compiled in this study will be very useful for scientific community when building their own estimate in the future, and also be relevant for quantifying the progresses towards mitigation target assessed through the global stocktake. Various estimates derived from both bottom-up and top-down methods were compiled and compared with UNFCCC NGHGI for EU27+UK in this manuscript, while data for other sub-regions of Europe were only provided on a website. The manuscript is well structured and well written in general. However, some descriptions and clarifications of all the data provided in this study will be essential for readers to be actually ben-

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efit from the compilation done in this study. For example, to facilitate the use of the data by others, it could be very useful to provide a detail instruction explaining how the data shared on zenodo was structured; how to read and process them automatically (e.g., providing a R/python program/package); I also noticed that the files provided on zenodo are only the numbers used to plot the figure shown in the manuscript and were separated to many small csv files with one line only and less than 1k size. I believe the data provided should be well organized for users (e.g., one file with overviews presented and multiple sheets each for a sector etc.). As a reader, I would mostly be interested in the original data presented in this study including country-specific values rather than aggregated to a few regions only. Depositing original values from each methods shown in the manuscript are essential for such publication (especially on journals like ESSD). As mentioned in the introduction, this manuscript focus on three questions. And in the summary and concluding remarks, they are more or less discussed. But I would expect more structural synthesis of the potential answers for these three questions. In addition, the only 2018 value was provided by MS-NRT as preliminary estimate. All the comparisons were done before 2017. Thus I would think the title should be changed to 1990–2017. Other remarks: L66: “compared to 0.9 Tg N₂Oyr⁻¹ from the BU data” may not be necessary. L148–160: It is not clear which gas or gases were referred to in this paragraph. L158: The abbreviation “LULUCF” was not explained before this line. L163: “from” is redundant. L171: Should it be “come from” instead “belong to”? L174: Please check the name of Tables in Appendix A. Why not using Table A1 and A2? Footnote 5: Why only Vol 5 of IPCC was cited? I believe methods from many other sectors and Volumes were used. Footnote 6: You mean “With natural CH₄, we ...” L225–230: It still is hard to understand how the emissions were scaled. L235: There is no Table 5. L266: “SURF” was not explained before. L268: The last sentence is not clear. L296: It seems not only anthropogenic emissions were described in section 3.1. L298: What are the differences between European and regional total? It looks like sub-regional total. L342: It is not clear how a less dense network of surface stations cause the BU = TD estimates. Some further explanations are needed. L534: Is there any reason

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that the GOSAT-derived estimates are so different from SURF-derived ones? L538-542 (and also across the manuscript): Can the uncertainty of the trends be given? In addition, it would be interesting to compare the trends of the common period 2010-2016. Otherwise, they are not comparable. L555: Can the authors give range or % uncertainty of TD estimates for a comparison? L581: The total EU27+UK GHG emissions in CO₂eq here is different from that in section 3.1.2. Please check. Figure 8: Is there any explanation of the sudden shift of EDGARv5.0 estimates in Fig. 8e? L650-652: It is not clear how the higher TD estimate can be attributed to the seasonal cycle. More explanations are needed. L705: This sentence is not correctly written. L706: “than” rather than “then”. L710: “fewer observations” in a specific region? I believe for global inversion, the total number of observations are more than those used in regional inversions. Table A: there are so many different grouping of European countries, which is very confusing. Why such groupings are used? Should it be further classified e.g., as countries, geographical sub-regions etc.?

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