

ESSD 2023-306 – Answers to reviewer 2 (in blue):

We thank the reviewer for his/her comments. We have taken into account all the new comments of the reviewer, and we hope that all the questions have been answered.

Minor comments:

P1L22: the word “activities” is repeated.

Suggested change: “Anthropogenic emissions are the result of many different economic sectors, related to transportation, power generation, industrial, residential and commercial activities, waste treatment and agricultural practices.”

The text has been changed as suggested by the reviewer.

P3L55: Please cite Peuch et al. 2022 (<https://doi.org/10.1175/BAMS-D-21-0314.1>)

The citation has been added

“The Community Emissions Data System (CEDS, version of April 2021)”

Can you cite the correct reference for the CEDS you use (Hoesly, Mcduffie or O’Rourke ?) ?

Some figures are using CEDSV2 and other are using CEDS.

The CEDS emissions are not using a version number, which makes the dataset not straightforward to cite. To make the text easier to understand, we have removed the sentence “We have used the country totals provided by the version of CEDS released in April 2021” as we already provide the location of the dataset.

P4L87: “Crippa et al. (2018; 2021)” The Crippa et al., (2021) reference is missing.

The Crippa et al. (2021) reference has been added

Also the Crippa et al., (2023) needs to be updated:

Crippa, M., Guizzardi, D., Butler, T., Keating, T., Wu, R., Kaminski, J., Kuenen, J., Kurokawa, J., Chatani, S., Morikawa, T., Pouliot, G., Racine, J., Moran, M. D., Klimont, Z., Manseau, P. M., Mashayekhi, R., Henderson, B. H., Smith, S. J., Suchyta, H., Muntean, M., Solazzo, E., Banja, M., Schaaf, E., Pagani, F., Woo, J.-H., Kim, J., Monforti-Ferrario, F., Pisoni, E., Zhang, J., Niemi, D., Sassi, M., Ansari, T., and Foley, K.: The HTAP_v3 emission mosaic: merging regional and global monthly emissions (2000–2018) to support air quality modelling and policies, *Earth Syst. Sci. Data*, 15, 2667–2694, <https://doi.org/10.5194/essd-15-2667-2023>, 2023.

The Crippa et al. (2023) reference has been updated

P5L105: “This dataset is available at: <https://doi.org/10.25584/PNNLDataHub/1779095> (last

access, July 2023)". Maybe this kind of sentences can be move to the data availability statement, also true for the other same references.

We are not sure about what to do for the "last access" mention. We have followed what many other authors have done in ESSD (for example in the Crippa et al., 2023) paper, i.e. indicate when was the last access for each website mentioned. If needed, we could just keep this mention of last access in the data availability section.

There is a point . missing before (We have used the country totals provided by the version of CEDS released in April 2021.)

As mentioned above, this sentence has been removed and a ":" Has been added.

P5L121: "global COVID19 pandemic", A pandemic is global by definition. Please remove global.

The word "global" has been removed.

P10L217: "The resulting dataset is called CAMS-GLOB-AIR: the current version of CAMS-GLOB-AIR is version 2.1, and it provides the emissions from aircraft from 2000 to 2023, for 25 levels. The altitude of each of these levels is given in Table S3."

Maybe it could be better phrased:

"The resulting dataset is CAMS-GLOB-AIR version 2.1, providing emissions from aircraft from 2000 to 2023, for 25 levels. The altitude of each of these levels is given in Table S3."

The current sentence has been replaced by the sentence suggested by the reviewer.

P10L239: Doumbia et al. (2021), the reference is missing, please add:

Doumbia, T., Granier, C., Elguindi, N., Bouarar, I., Darras, S., Brasseur, G., Gaubert, B., Liu, Y., Shi, X., Stavrakou, T., Tilmes, S., Lacey, F., Deroubaix, A., and Wang, T.: Changes in global air pollutant emissions during the COVID-19 pandemic: a dataset for atmospheric modeling, *Earth Syst. Sci. Data*, 13, 4191–4206, <https://doi.org/10.5194/essd-13-4191-2021>, 2021.

The Doumbia et al. reference has been added.

P10L243: "Covid-19". Please keep the same spelling (I believe COVID-19 is more appropriate).

We have checked all the mentions to the COVID pandemic, and made sure it is written in capital letters.

P11L266: "agriculture/ waste", remove the space "agriculture/waste" ?

The text has been changed as suggested.

P15L367: "NOx emissions have decreased importantly until the early 2010s, but a slowdown in

the emissions reduction is seen after 2012: this is consistent with the study of Jiang et al. (2018) based on satellite and ground-based observations: this slowdown can be explained by a growing contribution of off-road and diesel vehicles transportation emissions and industrial activities.” This can be rephrased, maybe separated in 2 sentences.

As suggested, the long sentence has been cut into two shorter sentences.

P16L404: Instead of the website, use a scientific citation (look for MEIC team publications on <http://meicmodel.org.cn>)

Two references have been added in the text:

Li, M., Liu, H., Geng, G., Hong, C., Liu, F., Song, Y., Tong, D., Zheng, B., Cui, H., Man, H., Zhang, Q., and He, K.: Anthropogenic emission inventories in China: a review, *Natl. Sci. Rev.*, 4, 834-866, doi: 10.1093/nsr/nwx150, 2017.

and

Zheng et al. (2018), which was already in the references list.

P17L416: Kurokawa and Ohara, please choose to cite it as Kurokawa et al. (as in P16L401) or Kurokawa and Ohara

The reference of the REAS paper is indeed Kurokawa and Ohara (2020). This has been corrected in the text.

P19L463: Tang et al., 2023, the paper is now published:

Tang, W., Emmons, L. K., Worden, H. M., Kumar, R., He, C., Gaubert, B., Zheng, Z., Tilmes, S., Buchholz, R. R., Martinez-Alonso, S.-E., Granier, C., Soulie, A., McKain, K., Daube, B. C., Peischl, J., Thompson, C., and Levelt, P.: Application of the Multi-Scale Infrastructure for Chemistry and Aerosols version 0 (MUSICA v0) for air quality research in Africa, *Geosci. Model Dev.*, 16, 6001–6028, <https://doi.org/10.5194/gmd-16-6001-2023>, 2023.

The reference has been updated

For CESM, you might want to also cite Ortega et al., 2023, that uses the CAMS_GLOB_ANT version 5.1 and CONFORM v2.1.

Ortega, I.; Gaubert, B.; Hannigan, J.W.; Brasseur, G.; Worden, H.M.; Blumenstock, T.; Fu, H.; Hase, F.; Jeseck, P.; Jones, N.; et al. Anomalies of O₃, CO, C₂H₂, H₂CO, and C₂H₆ detected with multiple ground-based Fourier-transform infrared spectrometers and assessed with model simulation in 2020: COVID-19 lockdowns versus natural variability. *Elem. Sci. Anth.* 2023, 11, 15.

Also, Gaubert et al., (2023) is the only study to performed inverse modelling with the CAMS_GLOB_ANT version 5.1 and found a rather good agreement with the inventory but with a small underestimation in China.

Gaubert, B.; Edwards, D.P.; Anderson, J.L.; Arellano, A.F.; Barré, J.; Buchholz, R.R.; Darras, S.; Emmons, L.K.; Fillmore, D.; Granier, C.; et al. Global Scale Inversions from MOPITT CO and MODIS AOD. *Remote Sens.* 2023, 15, 4813. <https://doi.org/10.3390/rs15194813>

These two references have been added to the document.

Finally, the Huijnen, 2022 reference is missing.

The Huijnen, 2022 reference has been removed as it is not a peer-reviewed paper, just a PDF available online from a scientific meeting.