

We thank the reviewer for his/her comments. We have taken into account all the comments of the reviewer, and we think the paper presents the data in a clearer way now.

Line 26 and 45: Rephrase "emitted at the surface". Currently, it suggests that aloft emissions (point sources, aircraft etc) are not necessary by omission.

Answer: the words "emitted at the surface" have been removed, as the paper also describes the vertical distribution of the emissions from aircraft.

Line 48: Might be worth referring to an overview paper of emission needs that talk about this (e.g, 10.1080/10962247.2019.1629363). Also, worth highlighting near-term top-down papers as another solution.

Answer: we have added a reference to the review published in 2023 by Granier et al., https://doi.org/10.1007/978-981-15-2760-9_5

Line 60: "most recent years" What level of fidelity is needed in the "most recent years"? Can you show that simple persistence from a previous year is not sufficient? Right now, this reads as an assumption that some readers may not yet have. Also, can you define the what is acceptable latency? Do you need this year now? One month lag? One year lag?

Answer: we have changed "most recent years" to "recent and current years". The CAMS/Copernicus forecasts are done for the present day, and the reanalyses also need emissions for the recent years. Activity data are generally available after a 2-4 years delay, and we have chosen to extrapolate the emissions to the current year, so that the forecasts models can use them as inputs for the forecasts simulations.

Lines 69-74: I think the omission of non BC/OC primary PM25 is not good. In my experience, some models go to extreme efforts to infer the non OC/EC primary PM25 emissions that are omitted from the model. For example, many models make gross assumptions about all OC having the same OC:OM ratio. Obviously, this ratio is specific to the emission activity generating it. What other species like crustal components? This paragraph is glossing over a need by saying that models deal with it.

Answer: At the suggestion of reviewer 1, we have removed the full section indicating why the CAMS-GLOB-ANT dataset does not provide the emissions of PMs, as there is no need to single out these two species, as also mentioned by Reviewer 2. Note that this section indicated a few papers that have also evaluated the CAMS-GLOB-ANT emissions in atmospheric models: the corresponding sentences have been now included at the end of Section 5. The development of the CAMS emissions is also dependent on users' requests. We will send the reviewer's remark to the CAMS/ECMWF management group, who might consider to add the emissions of PMs in future CAMS contracts.

Line 79: Because EDGAR and CEDS are overlapping, it would be nice to put up front some comment about how they are both used. You make it clear later, but it isn't for quite some time.

Answer: after the mention to the CEDS inventory, we have added the following words: "which are used for the extrapolation of the emissions to the most recent years," to indicate better that the EDGAR emissions are used as a basis and the CEDS emissions are used for the extrapolation.

Line 82: Is it true that this dataset does not include HTAP? If so, you should state why this was not a good starting place for CAMS.

Answer: The HTAP emissions are based on the EDGAR emissions, as for the CAMS emissions. A version of the CAMS emissions as a mosaic will be developed (in collaboration with the HTAP group at JRC) in 2024, and the discussions between the HTAP, EDGAR and CAMS emissions groups have started.

Lines 124-125, That seems inconsistent with the statement that activity is based on data from years 201-2018. COVID happened after the data. If it really is addressed, you'd need some clarity on the scope of the activity data to better match the statement.

Answer: some more details on the back casting of the ship emissions are now given in a new sentence: "The earlier years, 2000-2013, have been back casted based on 2016 activity data and using scaling factors taking into account for fleet size growth, the lower energy efficiency and smaller ship size in previous years: these factors take into account the lower. These scaling factors are applied separately for various shipping segments."

The detailed values used for the back casting are the following:

"For example, the percentage change per year that was used for the size of ships is the following: Ropax vessels: 1.25%/yr; RoRos, Vehicle carriers: 1.25%/yr; General cargo ships, Bulk cargo ships: 0.4%/yr; Containerships, refrigerated cargo ships: 1.2%/yr; Chemical tankers, Crude oil tankers, LPG tankers, Oil Product tankers: 2%/yr; Small passenger ships, Ferryboats, high speed craft: 0.3%/yr; Cruise ships: 0.3%/yr; Fishing vessels: 0.3%/yr; Other ship classes: 0% /year
For the fuel consumption changes, the following percentages were used: Ropax vessels: -2.2%/yr; RoRos, Vehicle carriers: -2.2%/yr; General cargo ships, Bulk cargo ships: -1.7%/yr; Containerships, refrigerated cargo ships: -2.2%/yr; Chemical tankers, Crude oil tankers, LPG tankers, Oil Product tankers: -1.9%/yr; Other ship classes: -1.3% /year

If requested by the reviewer, these values could be put in a table in the supplement of the paper, though the focus of the paper is not on ship emissions.

Lines: 136-138, You should remove "monthly" given that you have daily profiles. Maybe month-specific? Also, do you have diurnal profiles?

Answer: The sentence has been modified and the mentioned daily and weekly temporal profiles have been removed, as the CAMS-GLOB-ANT dataset is provided as monthly averages. The sentence is now: "the monthly temporal profiles used in CAMS-GLOB-ANT are available on the ECCAD database"

Line 138, Consider species separately? Or at sectoral level giving rise to variability in primary pollutants? Or sector-species specific?

Answer: the word "categories" has been changed to "sectors", in order to make it clearer that the temporal profiles are applied to the same sectors as the ones considered in the CAMS-GLOB-ANT emissions.

Line 155, Given that 2020 was the COVID year, this seems like a mistake. Why not use 2019?

Answer: even if the emissions have changed significantly in 2020, the temporal profiles did not change, compared to previous years.

Line 175-190: The methodology for geometric projections seems unnecessarily complex for the 2016-2019 period. Why not use the actual ratio change in CEDS for those years and then use the mean factor for future years (i.e., outside of both CEDS and EDGAR)?

Answer: the methodology we used has been tested in the previous CAMS-GLOB-ANT versions and compared with other methodologies such as the one proposed by the reviewer. After several tests using chemistry-transport models and observations of CO and NO_x for the most recent years, we adopted the methodology described in the paper, as it gave the best results.

Line 199, Figure 3: caption "growth factor for the industry factor"? Maybe "growth factor for the industry sector"?

Answer: the figure caption has been changed, and the word “sector” is now used.

Line 301, Seems weird that you left out NMVOC, but kept in BC. This is not consistent. I would also recommend adding NMVOC to the list of significant decrease ("CO, NO_x, NMVOC, SO₂, and BC have")changing "other species" to a "NH₃ and OC".

Answer: we are not sure about what the reviewer indicates as “weird”. Line 301 refers to Figure 8. This figure includes NMVOCs, this species was not left out in the figure. “other species” has been replaced by “NH₃ and OC”.

Line 493-497, This seems like a small list. Perhaps expand on key other uncertainties.

Answer: The last sentence has been modified, and is now” “The current limitations of the inventory will be considered, such as the constant NMVOCs speciation after 2012 (following the EDGAR VOCs speciation), the inclusion of more up-to-date data for the extrapolations to the more recent years, the inclusion of the CONFORM adjustment factors for the Covid-19 lockdowns directly into the emission dataset and when possible the inclusion of regional information for the different species and sectors.”