



EGUsphere, referee comment RC1
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Comment on egusphere-2022-283

Anonymous Referee #2

Referee comment on "Technical note: The CAMS greenhouse gas reanalysis from 2003 to 2020" by Anna Agustí-Panareda et al., EGU Sphere,
<https://doi.org/10.5194/egusphere-2022-283-RC1>, 2022

Review of "The CAMS greenhouse gas reanalysis from 2003 to 2020" by Agustí-Panareda et al.

This paper describes the greenhouse gases (CO₂ and CH₄) reanalysis as prepared for the Copernicus Atmosphere Monitoring Service (CAMS). Manuscript draft is well prepared for understading of the work that is carreid out. The method is well described but the results are not fully satisfacotry yet. Many traditional inversions produced better statistics for model simulated CO₂ and CH₄ concentrations by optimising the surface sources and sinks (e.g., Chandra et al., ACP 2022). However, the approach holds different promises for 4D concentration product of CO₂ and CH₄ in near realtime along with other meteorological parameters of ECMWF weather forecasting system. In general I recommend publication of the manuscript as "Technical note", after accounting for some of my comments below.

Line 48: are the SCIAMACHY and IASI data good enough for assimilation ? the growth rate may be fine but the spatial distribution are probably of poor quality.
I have found later that this is mentioned in the caveats. No action is needed but I am just making sure to mention the points of concern

Figure 1: I have several doubts on these plots.

- 1) the total column CO₂ values on Dec 2020 are of similar magnitude of CO₂ at MLO (414 pmm as per SIO flask data). I was thinking that global mean XCO₂ will be a couple ppm lower than MLO value. Please confirm.
- 2) What is the advantage of showing 2003-2020 mean as opposed to just 2020 seasonal means ?

Figure 2: Should the two-way arrows between Forecast "Sphere" and Surface flxes "Maps" be one-way ? From Fluxes to Forecast

Table 2: You could use FF-CO2 emissions EDGARv6.0 etc. or the GridFED by UEA group. Similarly many of the flux components of CO2 and CH4 should be revised by using the most recent flux data sources. I not saying for this paper but in the near future.

Line 352: I think it would have been nice to add/subtract some CO2 flux to make the CO2 flux budget consistent with observed CO2 growth rate. At the very least the land biosphere + ocean exchange could be added/subtracted with an offset to balance all sources+sinks = 2.12 * Growth rate * 2.12. Then the statistics may be look that bad.

Figure 7: It would be nicer to use a discrete colour scale (like in Fig. 7). Otherwise, it is hard to distinguish between medium blue/red from dark blue/red

Also consider showing a Taylor diagram, like I see bellow for the TCCON sites

Do you need this Figure 14 ? If needed I suggest a more detailed site information is shown before Fig. 7. The Surface, MBL, TCCON, NDAAC, AirCore etc. sites can be shown in different symbols