



EGUsphere, referee comment RC2
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Comment on egusphere-2022-283

Anonymous Referee #3

Referee comment on "Technical note: The CAMS greenhouse gas reanalysis from 2003 to 2020" by Anna Agusti-Panareda et al., EGU sphere,
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This article presents a description of a new reanalysis dataset of greenhouse gases (GHGs). This is the first GHG reanalysis dataset ever produced using data assimilation techniques that adjust GHG concentrations rather than GHG fluxes. As such, it is a formidable achievement but at the same time, there is considerable room for improvement (as noted by the authors in sections 4 and 5). Reanalyses are typically improved after feedback from the user community and/or with improved data assimilation techniques or increased numbers of observations. Thus an important aspect of reanalysis production is the dissemination and documentation of the products to encourage and inform the potential user community. That is the main purpose of this article. As such, the comments below are primarily aimed at improving the description of the product to potential users.

Specific comments

- Section 2.2 and Table 1: It would be useful to know how the satellite instruments were selected. For example, OCO-2 was not used. In section 5, it is mentioned that it will be used in future versions, but it is useful for the user to understand the rationale behind the selection of instruments for this product.
- Line 99 and section 2.3: Figure 2 shows 2-way interaction between the forecast and surface fluxes. Please explain how the forecast influences the surface fluxes in section 2.3 or line 99.
- Section 2.3: There is no mention of Figure 3 in the text. It is useful to understand why this Figure is presented, and the main message behind it.
- Line 184: What is the rationale behind the choice of EDGAR versus higher spatial resolution datasets for anthropogenic emissions?
- Line 217: Typo: TI255 should be TL255 presumably.
- Line 302: I do not see the 20 ppm error in Figure 5. If the vertical scale in Fig. 5c (bottom panel) is linear then the green and red dashed curves seem to overlap after 2019, meaning errors of less than 5 ppm.

- Lines 368-370: Taylor diagrams of Figs. 8b, 11b. What is the normalization used on the radial axes? Presumably it is the observed standard deviation for a given site. Why was this normalization needed? Standard Taylor diagrams do not do a normalization. Presumably it allows for better comparison among sites with very different observed variability.
- Lines 457-8 and Fig. 13: How was the site for Fig. 13 chosen? Is it a typical example, or a good example? It is nice to see that the overall structure of the profile (esp. for CO₂) is well captured in boreal summer in France. It would be interesting to see the comparison in the southern hemisphere. Are the general biases of Fig. 12 more evident in New Zealand?
- Line 496: Since this is a reanalysis, why were the insitu data not assimilated? Would they be enough to better constrain the global growth rate? Will this be done in the future?