

Anonymous Referee #2, 21 Aug 2026

This manuscript develops a low-lag monthly CO₂ emission dataset for Japan using primarily official monthly activity data. The data sources, estimation methods, data processing, and uncertainty assessment are described in detail. The resulting dataset is valuable for timely emission monitoring, policymaking, public awareness, and independent verification, and generally meets the quality requirements of *Earth System Science Data*. However, several minor issues should be addressed to improve the clarity and readability of the manuscript. Therefore, I offer the following comments and suggestions.

Thank you for your helpful and encouraging comments.

1. The manuscript is somewhat lengthy and could be streamlined to improve readability. In particular, the detailed descriptions of other datasets in Sect. 3.6 partly overlap with the Introduction, and some of these methodological details could be shortened or moved to the Appendix. The discussion of potential applications could also be condensed, allowing the main text to focus more clearly on the construction, evaluation, and key findings of the dataset.

We have moved the detailed description of the data source (bulk of Sect. 2.4) to the Appendix, and adjusted the text to align with this. We have left Sect. 3.6 since these are analysis results, but we made sure to avoid substantial overlap with other sections.

2. Table 1 lists refinery feedstocks among the secondary fuels with available trade, stock, and consumption data, whereas Sect. 3.5.1 states that refinery feedstocks are excluded from this study due to the lack of reliable monthly data. Please clarify this apparent inconsistency and revise Table 1 or the corresponding text accordingly.

Thank you for pointing this out. We have revised Table 1 to match the text.

3. Before presenting the relative differences in Figure 12, I suggest first showing the absolute monthly emissions from the different datasets. This would provide readers with a clearer view of their overall emission levels, trends, and seasonal patterns before interpreting the relative discrepancies.

We had decided not to add a figure showing the absolute emissions since the large number of datasets, the high intra-annual variations, and the high correlation between them makes the figure undecipherable and confusing (figure below). Instead of adding this figure in the text, we opt to add a figure showing emissions just from our dataset for the same period, while also adding the full comparison figure in Appendix L.

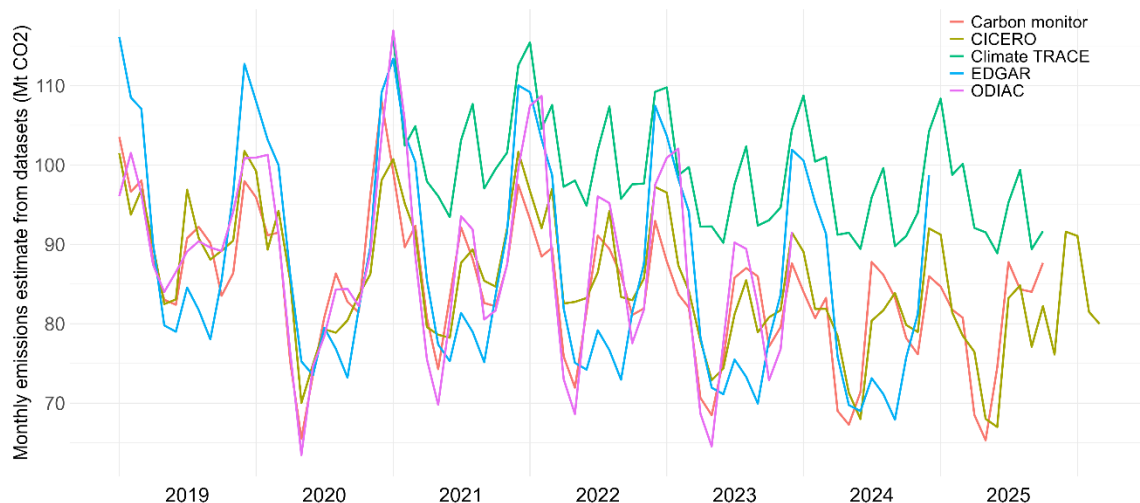


Figure 1 Monthly emissions estimate with absolute value shown for all datasets

4. Although some differences in emission coverage are discussed in Sect. 3.6, I suggest adding a brief table, perhaps in the Appendix, summarizing the emission scope of all datasets compared. This would help clarify whether the total emissions compared across datasets are directly comparable.

We added a table in the Appendix summarizing the designed scope of the datasets.

5. Please carefully check the manuscript for formatting, cross-reference, and reference-list errors. For example, “see 50Appendix F” appears in the Introduction, “Figure 8Figure 8” appears in Sect. 3.1, and several incomplete references such as “Figure)” remain. The reference list also contains several formatting inconsistencies, including duplicated punctuation, a duplicated DOI prefix for Min and Choi (2024), and incomplete page ranges for some journal articles. Please carefully proofread and standardize the manuscript and reference list according to the journal format.

Thank you for pointing these out. These seem to have been inserted during the PDF conversion process. We fixed these errors and made sure to unlink automatic revisions.

6. The presentation of several figures should be improved for clarity and consistency. In particular, the labels and text in some figures are too small to read clearly (e.g., Figures 10 and 12), and Figure C1 uses different line colors without a corresponding legend. Please check the figures throughout the manuscript and improve their readability and presentation where necessary.

The figures have been revised to improve readability and clarity. A description of the Figure C1 colors has been added to the caption.

7. For Table 2, please briefly clarify how “Trend” was calculated and how its statistical significance was assessed.

The trend is estimated using a simple linear regression. We clarified this in the text.

8. Footnote 3 in Sect. 2.4.3 appears to contain an arithmetic inconsistency: $0.428/(1-0.428)$ is approximately 0.748 rather than 0.728. Please verify the conversion factor and clarify whether this is only a typographical error or whether it affects the lime-emission estimates and the released dataset.

Thank you for pointing this out. The value is indeed 0.748 and we have fixed the numerical value in the text. The analysis had used the correct value and is not affected.