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This manuscript has been previously reviewed at another Nature Portfolio journal. This document only contains reviewer comments and rebuttal letters for version considered at Communications Earth & Environment.

12th Feb 24

Dear Dr Hodnebrog,

Your manuscript titled "Earth's energy imbalance trend strengthened by recent aerosol emission reductions" has now been seen by our reviewers, whose comments appear below. In light of their advice we are delighted to say that we are happy, in principle, to publish a suitably revised version in Communications Earth & Environment under the open access CC BY license (Creative Commons Attribution v4.0 International License).

We therefore invite you to revise your paper one last time to address the remaining concerns of our reviewers. At the same time we ask that you edit your manuscript to comply with our format requirements and to maximise the accessibility and therefore the impact of your work.

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Best regards,

Alienor Lavergne, PhD
Associate Editor
Communications Earth & Environment

REVIEWERS' COMMENTS:

Reviewer #1 (Remarks to the Author):

I don't have additional comments other than adding ocean heat data somewhere. Considering that Figure 1 is already busy, the information could be added into the supplemental materials.

Reviewer #2 (Remarks to the Author):

This is my 2nd review of "Earth's energy imbalance trend strengthened by recent aerosol emission reductions" by Dr Hodnebrog and colleagues. The authors have revised the original manuscript according to my recommendations and I find it clearly improved in terms of presentation and discussion of the results. The authors have also incorporated most my other feedback to my satisfaction.

While still subject to some limitations inherent to such data-model comparisons, which are properly acknowledged in the manuscript, the study presents interesting and significant findings, and I recommend publication as is.

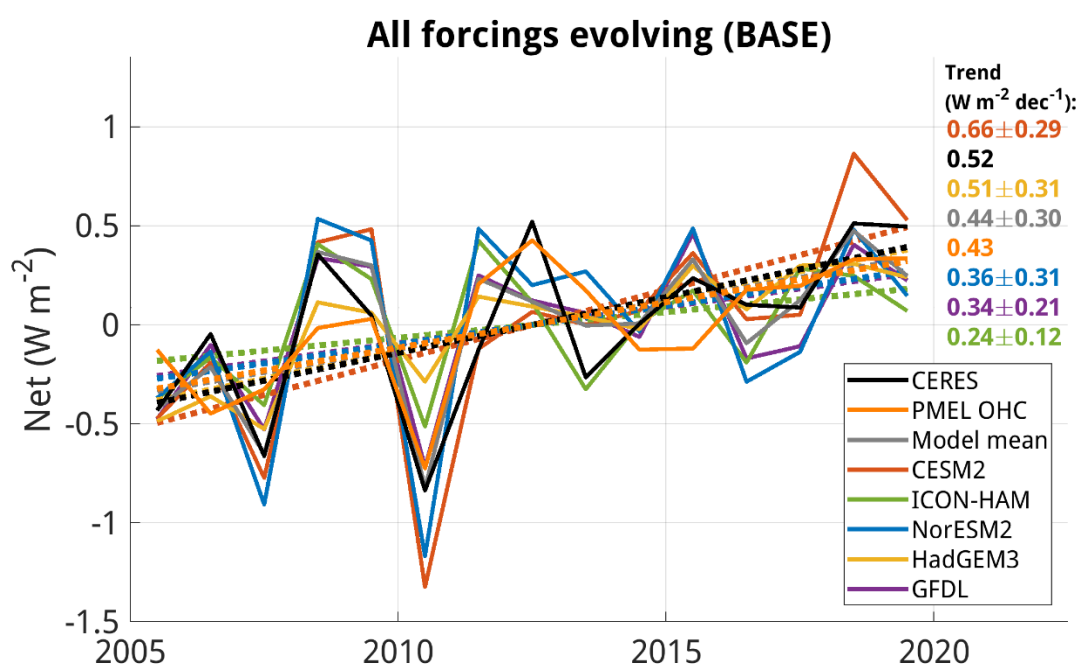
Review and responses - “Earth’s energy imbalance trend strengthened by recent aerosol emission reductions”, Communications Earth & Environment (COMSENV-24-0215-T)

Please find below the reviewer comments (in *italic*) and our responses (in blue).

Reviewer #1

I don't have additional comments other than adding ocean heat data somewhere. Considering that Figure 1 is already busy, the information could be added into the supplemental materials.

Response: We sincerely thank the reviewer for carefully reviewing our manuscript in both rounds. We have now added data on ocean heat content in a new Supplementary Figure 2:



Supplementary Figure 2. Same as Figure 1a in the main manuscript except that annual ocean heat content (OHC) data from the Pacific Marine Environmental Laboratory (PMEL) (Loeb et al., 2021) have been added as anomalies (thick solid orange line) and trend (thick dashed orange line), and that data are only shown for 2005-2019 and without individual ensemble members for the models.

The following text has been added to the first paragraph of the Results and Discussion section:

“The positive EEI trend in CERES and models is also in agreement with estimates of ocean heat content anomalies for 2005-2019 (Supplementary Fig. 2).”

The following text has been added to Methods:

“Ocean heat uptake observations. Annual in situ estimates of the observed ocean heat uptake over 0-2,000 m for 2005-2019 from the Pacific Marine Environmental Laboratory (Loeb et al., 2021) have been used for comparison to the satellite observations and model data.”

The following text has been added to the Data availability statement:

“The ocean heat content anomaly data were obtained from the NOAA Pacific Marine Environmental Laboratory website at <https://oceans.pmel.noaa.gov/upper-ocean-heat-content-data> (downloaded 16 February 2024).”

Reviewer #2

This is my 2nd review of "Earth's energy imbalance trend strengthened by recent aerosol emission reductions" by Dr Hodnebrog and colleagues. The authors have revised the original manuscript according to my recommendations and I find it clearly improved in terms of presentation and discussion of the results. The authors have also incorporated most my other feedback to my satisfaction.

While still subject to some limitations inherent to such data-model comparisons, which are properly acknowledged in the manuscript, the study presents interesting and significant findings, and I recommend publication as is.

Response: We sincerely thank the reviewer for their positive comments and for carefully reviewing our manuscript in both rounds.