

Authors' response to editor report

The authors thank the editor for the careful examination of our response and the corrected manuscript. We answer each point of the editor report here in this document and undertake all the requested minor revisions of the manuscript.

Editor report

Please address the following minor points:

Line numbers refer to the tracked changes version.

Line 123: What is the aerosol background for 2025? Just sulfate from OCS or does it include volcanic input like the one from Ruang in 2024? A sentence on that in the description of WACCM (line 233) disappeared. More information please.

This is a good point, as it is not explicitly mentioned, only found in the cited reference Tilmes et al. (2025a), which states this about the background conditions of the CCMI-2022 experiment:

"For producing elevated stratospheric background aerosol conditions to represent eruptive volcanoes, the experiment used an average of the eruptive volcanic SO₂ emissions from 1850 to 2015, following the recommended CMIP6 setup..."

This means that in the year 2025 the forcing is composed of a major sulfate part from source gases and a minor added part representing smooth, averaged out volcanic emissions. Actual eruptive events like (Mount Ruang 2024) are not included.

We change the senD2-fix description to include this information and also provide the Tilmes et al., 2025a reference in it.

Line 149: Insert a sentence there that this scenario was performed only by CMAM, SOCOL and NIES and remove the sentences on that in the model description part (e.g. line 235 and 278).

We removed the sentences in the model description part and added the sentence

"The senD2-chem simulation was only performed by three models: SOCOLv4, CMAM, and CCSRNIIES-MIROC3.2 (see Section 2.3 for model descriptions)"

in the description of senD2-chem, wherein we use the full model names, since the abbreviations are not introduced by this point, and link to the model description section.

Table 2: Refer to section 2.3 in caption. Include footnotes with names of the radiation codes spelled out and/or references.

We update the caption with a reference to Section 2.3 and include a citation for RRTMG directly in the table, which was previously missing:

Iacono, M. J., Mlawer, E. J., Clough, S. A., and Morcrette, J.: Impact of an improved longwave radiation model, RRTM, on the energy budget and thermodynamic properties of the NCAR community climate model, CCM3, *Journal of Geophysical Research: Atmospheres*, 105, 14 873–14 890, <https://doi.org/10.1029/2000JD900091>, **2000**.

We decide not to use footnotes for any of the module names for consistency, since some of the abbreviations typically do not have a spelled-out form in the literature. We deem that the citations in the table provide sufficient reference, because the main point of mentioning the various modules in the context of this manuscript is to show the differences and similarities between the chemistry-climate models.

Line 189: A remark on modal models and the radiative properties of included modes should be added here. Is for example only the accumulation mode considered? Is this information in the cited reference?

The radiative properties – which are used in the radiation scheme – are separate from the modes or bins of the modal or sectional aerosol scheme. They are calculated on bands between two wavelengths each and span the relevant shortwave and longwave part of the spectrum in various resolutions. However, some assumptions indeed had to be made in the Mie calculation from WACCM-CESM2 model output aerosol information. The model data exists in three modes, for each of which we assume a fixed geometric standard deviation for their respective size distribution. This information is indeed included in Section 3.5 in the reference (Jörimann et al., 2025), as described in the text.

To draw attention specifically to the issue of deriving radiative properties from a modal model, we extend the sentence like this:

"The exact procedure for CCMI-2022, **including the assumptions made to use size-related aerosol data from a modal aerosol model for Mie calculations**, is detailed in Section 3.5 of Jörimann et al. (2025)."

Technical corrections

Line 162: Please correct parentheses.

Parentheses are corrected.

Table D1, footnote: NAT is solid

Thanks for pointing out this mistake, the footnote is corrected and also linked in the table caption.