

Reply to Editor

Thanks for your effort to address the reviewers' comments. One reviewer still has a few technical comments. Please address them.

Reply: Thank you for handling our manuscript. We have addressed your comments and the reviewer's remaining comments and have uploaded a revised manuscript together with a point-by-point response, with all changes clearly marked. We have also adjusted the color scheme in Figure 7 to ensure that readers with color vision deficiencies can correctly interpret the results.

I have some comments:

1. "aerosol indirect feedback" is used (e.g., Line 49 and many places in the text) alternately with "aerosol indirect effect". Please define what is "aerosol indirect feedback" if you mean it differently from "aerosol indirect effect" commonly used in the literature.

Reply: Thank you for this helpful comment. We agree that “aerosol indirect effect” is the more standard term and have revised the manuscript accordingly. We now use “**aerosol indirect effect(s)**” throughout the manuscript when referring to aerosol-induced changes in cloud microphysical and radiative properties. Where necessary, the interactive aerosol–cloud–meteorology coupling pathway is described explicitly rather than using “aerosol indirect feedback” interchangeably with “aerosol indirect effect.” The terminology has been checked throughout the manuscript for consistency.

2. How does the GEFS-Aerosols treat secondary organic aerosols?

Reply: We thank the reviewer for this question. GEFS-Aerosols uses the bulk GOCART aerosol module, in which organic aerosol is carried only as primary organic carbon; secondary organic aerosol is not a prognostic species, and nitrate and ammonium are likewise not represented. We have noted this in Section 7 and discussed it together with our future development plans in the Conclusions: *“Several aerosol species are absent from the present configuration. The bulk GOCART module in GEFS-Aerosols carries no secondary organic aerosol, nitrate, or ammonium, so these contributions are missing from the aerosol fields used here.”*

3. Please add an outlook for volcanic aerosol (e.g., Mills et al., 2016, JGR; Hu et al., 2025, ACP).

Reply: We thank the reviewer for the suggestion and the references. Our configuration does support volcanic emissions, but this option was not activated

because no significant eruption occurred during the simulation periods. We have noted this in Section 7 and added a short outlook in the Conclusions citing Mills et al. (2016) and Hu et al. (2025), identifying application to a volcanically perturbed period as future work: *“Volcanic emissions are supported by our configuration but were not activated, as no significant eruption occurred during the simulation periods. Including these species is planned for future development, and applying the same framework to a volcanically perturbed period is a natural extension, given that prognostic volcanic emissions substantially alter simulated aerosol burden and optical properties (Mills et al., 2016) and that the resulting sulfate size distribution is sensitive to the treatment of chemistry and aerosol modes (Hu et al., 2025).”*

Reply to anonymous referee #2

The authors addressed my comments very well. I recommend acceptance for publication after some minor revisions.

Reply: Thank you for your positive assessment and recommendation. We appreciate your helpful comments and have addressed the remaining minor revisions accordingly.

section 7: ", consistent with the findings of previous study Li et al. (2024)" --- how about ", consistent with the findings of the previous study by Li et al. (2024)"?

Reply: Revised.

Fig. 1: CCPP Version - why is "GOCART Aerosol/Chemistry" used in the diagram if GOCART is an "aerosol" module? Do you mean GOCART used archived oxidant fields for aerosol chemistry before AM4.1 gas chemistry was introduced in the model? Should it be "GOCART Aerosol"?

Reply: We thank the reviewer for this question. In the CCPP version, interactive gas-phase chemistry (AM4.1) has been added alongside the GOCART aerosol module, with support for additional chemical schemes, so the component is no longer aerosol-only and is labelled "GOCART Aerosol/Chemistry" accordingly. We have clarified this in the Figure 1 caption.

Fig. 5 caption: add ", respectively" at the end.

Reply: Added.