

## **Review round 2 – egusphere-2024-3356**

12/05/2025

I thank the authors for their responses to the previous round of reviewer comments. I am glad to see the revisions made to the text which address both my and other reviewers' concerns well.

I have a single additional point I would like to see revised before the paper is accepted. In the abstract the claim is made that "Further, we find Simple Climate Models (SCMs) tend to over-estimate temperature reversibility compared with ESMs". I completely agree that SCMs are shown to overestimate the extent of reversibility in comparison to more complex models of the earth system under flat10MIP experiments.

However, I do not agree the results in this study warrants a blanket statement on the ability of SCMs to capture reversibility following net zero. In the main text you offer a more nuanced discussion of this result in places, including noting that it is unclear how much of your result is a consequence of the parameter ensemble chosen for each SCM, as opposed to a consequence of the structure of SCMs being incapable of capturing hysteresis in reversibility experiments. It would be good to adapt the statement in the abstract, and have a quick check in the rest of the text, to make it clear that you are describing the ability of the standard, or historically-constrained, parameter distributions in SCMs to capture the reversibility characteristics of ESMs, and not necessarily a comment on the ability of SCMs to capture these ESM behaviours overall.

I am happy to accept the manuscript with these revisions.