Response to review round 2.

Many thanks to the reviewer for the positive assessment.

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 oPer 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.

Thanks for this point. We agree that the previous version perhaps implied that the bias was inherent to SCMs, rather than potentially a result of an absence of calibration targets relevant to ZEC and reversibility in operation pipelines used for SCMs. We've revised the sentence in the abstract as follows:

"Further, we find existing probabilistic Simple Climate Model(SCM) ensembles tend to over-estimate temperature reversibility compared with ESMs, highlighting the need for additional constraints. "

With similar refinements elsewhere in the document.