

Interactive comment on “Reduced complexity model intercomparison project phase 1: Protocol, results and initial observations” by Zebedee R. J. Nicholls et al.

Anonymous Referee #2

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I recommend rejecting this paper for three main reasons:

1. The purpose of this paper remains unclear
2. The robustness of the scientific results remains unclear, and there is too little information in this paper to understand the analyses carried out
3. The logic of a substantial number of sentences remains unclear

These issues are the more surprising given the scientific expertise of the large number of co-authors listed on the title page.

Given the importance of the results hinted at here, I encourage a re-submission of this

manuscript.

In the following, I provide examples for the three overarching issues. I trust that a detailed listing of all issues is unnecessary given the expertise of the panel of authors.

1. According to the title, this paper provides the protocol, results and initial observations of RCMIP. However, the protocol is described on only about half a page, and the results are listed on only about three pages. In fact, much of these three pages describe possible future research rather than providing actual results. In contrast, half the paper consists of a description of individual RCMIP models. I encourage the authors to more clearly define the purpose of this paper, and to have the text more directly reflect such purpose.

2. I was unable to follow how the evaluation of RCMIP models has been carried out, and which conclusions one can draw from any such analysis. Which observational datasets were used? What is their uncertainty? Which CMIP6 models were used for the comparison? Which degree of agreement can one expect given, for example, observational uncertainty and natural variability? Which degree of agreement can one expect given the tuning of RCMIP models? How is the statistical significance of model agreement or disagreement calculated? What is actually shown in the figures for individual RCMIP models? How is the result obtained that "46 % of the difference between CMIP5 and CMIP6 is scenario dependent"? Why is there no uncertainty attached to this number? Which assumptions went into its calculation? etc. etc. etc.

3. Just some example of unclear logic/grammar/style:

I.23: RCMs do not exchange limited resolution for computational efficiency. They have limited resolution, and are therefore computationally efficient.

I.32: If it was "unfeasible to perform climate assessments with ESMs", no IPCC reports would exist

I.40: What is "observationally consistent"?

I.40: Why does only a "large range of projections" provide useful statistics? Later in the paper it is shown that the range of CMIP6 projections is larger than that of RCMIP projections. Does this imply that CMIP6 simulations provide more useful statistics?

I.46: Style: "The first is a comparison with observations. These comparisons provide the most direct comparison of model response with the world around us today." What is a 'direct comparison with the world around us'? What is compared with observations? Which observations? etc.

I.82: What is "projected warming uncertainty"?

I.104: "This ensures consistency with CMIP6, albeit at the expense of using the latest data sources". Why is it an expense to use the latest data sources?

I.119: "Given their focus on global-mean, annual mean variables we request a range of output variables from each RCM." The logic of this sentence is not clear to me.

I.129: 'In the climate response to radiative forcing, the models range from two-box impulse response models to...' Probably should read "In their representation of the climate response to radiative forcing.?" etc.etc.

The description of models in 2.3 should be harmonized (including the level of details provided) to allow the reader to quickly compare characteristics of different models.

I do not comment in detail on section 3 as this section needs to be entirely re-written in my view.

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I am sorry that I cannot provide a more positive review at this point. The important results hinted at here are potentially so important that they deserve a more rigorous analysis and description.

All the best for revising this study.

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Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2019-375>, 2020.

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