Review of egusphere-2025-2103

Scenario set-up and the new CMIP6-based climate-related forcings provided within the third round of the Inter-Sectoral Model Intercomparison Project (ISIMIP3b, group I and II)

Anonymous Reviewer

Summary

The paper provides a general description of the climate-relative forcings, based on climate simulations performed during CMIP6, and improvements made for realistic representation of various climate forcings in the third simulation round of the Inter-Sectoral Impact Model Intercomparison Project (ISIMIP3b). The paper serves as a reference to perform impact model simulations using the forcing specifications described here, which can be used to evaluate the impact of climate forcings in different scenarios.

This is not a particularly long paper since most of it consists of table sand lists, but it is riddled with references pointing to incorrect tables and especially non-existent ones, whose contents cannot be found anywhere on the manuscript. As such, I was not able to comprehensively review this manuscript and recommend that the manuscript go through another round of revision.

Comments

L93

I know that the description has been given in the first paper for different sectors being considered; however, I'd like to see a concise summary of these sectors in the introduction, especially because too many references have been made here about how this work influences different sectors, but it is difficult to see what they are exactly.

L144

This sentence needs some proof-reading. The scenarios were chosen to "capture a wide range of possible futures", then "the availability of climate model simulations"? Perhaps the authors meant to "utilize" the availability or something along those lines?

L155

"Only" sounds odd here. Perhaps the authors meant "eventually"?

L157

Wrong quotation mark.

L158

I have two issues with this whole discussion on the *plausibility* of different scenarios. The first is that it has been claimed that the scenarios were chosen to "capture a wide range of possible futures" (L144), but the only thing that is discussed here is how some of the SSP scenarios are unrealistic. I do agree that some SSP scenarios are unlikely [1], but I do not see anything particularly *wide* regarding the choices. I do not think all future predictions must include extreme cases, but I am just not fully convinced of the stated goal of the ISIMIP3b scenarios. The second is that it is not clear

what the authors consider as the "business as usual" scenario. What do the authors actually think of the "business as usual" scenario, now that they have refuted almost all scenarios used in ISIMIP3b? My main concern is that the authors leave a number of open questions regarding the choice of plausible scenarios.

L205

To be honest, I cannot keep track of all the errors when it comes to references to figures and tables in this paper. Here, "Table 11" should be the correct one. I have also found cases where the authors refer to tables that simply do not exist. The manuscript needs an overhaul.

L228

This should be "to include".

L229

I believe it should be "impact distribution".

L237

I believe the authors are referring to "Table 2". I will not comment further about this, but always directly refer to the table being discussed, not "the table".

L298

I do not think a comma is needed here.

L309

"Too sparse"?

L333

Again, wrong table.

L453

I think it is unusual to only write the variable names. The authors did write "sea level pressure (psl)" at one point, and I think this should be the convention. Write both the variables names and the actual names of the properties being referenced so the readers will not have to go back to the table every time they encounter a variable name, at least for the first time.

L479

Table 16 does not exist.

L512

I do not find it particularly significant that the mean ECS is exactly the same as that of CMIP6, as it is a subset of CMIP6 ensemble. However, one important aspect of the estimation of ECS in CMIP6 is

that the variability in the estimates of ECS is still very large [2], [3]. I would like to see a detailed discussion on the variability of ECS, especially on how various factors influence the estimate of ECS in each GCM.

For example, the five GCMs chosen for this study seem to produce short-wave and long-wave radiative effects from clouds that are consistently close to median RMSD of the CMIP6 ensemble, and I would assume that as a result, the variability should be much smaller than the whole CMIP6 ensemble. Is it really the case? If not, what is driving the variability?

L518

Table 12 does not exist. At this point, there are too many errors involved in references to its own tables. I will not mention them from now on, but I do find it very odd that there are a number of references to tables that simply do not exist in the manuscript.

L548

What do you mean that the new approach "improves the spatial variability"?

L577

From this line on, references appear with parentheses where they should not.

L612

Why was the 5% threshold chosen? What was the reasoning behind this specific number?

L679

"Artifacts"

L722

I am not sure what I am supposed to find out in Table 4, which does not include any specifications of forcings or GCM data. This could be another case of incorrect table reference, but I cannot find the relevant information anywhere on the submitted manuscript.

L783

I am fairly certain that this is against GMD policy.

L787

What is the point of having the "Datasets" column if they are all the same? Surely you could have just added a note just for the surface temperature, or write it down in caption?

Bibliography

[1] R. Pielke Jr, M. G. Burgess, and J. Ritchie, "Plausible 2005–2050 emissions scenarios project between 2 ℃ and 3 ℃ of warming by 2100," *Environmental Research Letters*, vol. 17, no. 2, p. 24027, Feb. 2022, doi: 10.1088/1748-9326/ac4ebf.

[2] N. Scafetta, "Advanced Testing of Low, Medium, and High ECS CMIP6 GCM Simulations Versus ERA5-T2m," *Geophysical Research Letters*, vol. 49, no. 6, Mar. 2022, doi: 10.1029/2022gl097716.

[3] M. D. Zelinka *et al.*, "Causes of Higher Climate Sensitivity in CMIP6 Models," *Geophysical Research Letters*, vol. 47, no. 1, Jan. 2020, doi: 10.1029/2019gl085782.