



EGUsphere, referee comment RC2
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Comment on egusphere-2022-471

Anonymous Referee #2

Referee comment on "The IPCC Sixth Assessment Report WGIII climate assessment of mitigation pathways: from emissions to global temperatures" by Jarmo S. Kikstra et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-471-RC2>, 2022

This paper details the climate assessment processing steps developed between IPCC Working Groups I and III to assess temperature outcomes of emissions pathways and introduces an open source climate assessment Python package that can facilitate this processing. The processing steps include (1) vetting of emissions scenarios submitted to the AR6 Scenario Explorer, (2) harmonization of vetted emissions scenarios with historical emissions, (3) infilling of missing species in the emissions scenario, and (4) assessment of the emissions-climate response with three climate emulators. The paper then evaluates the impact of this processing on global-mean temperature projections and effective radiative forcing statistics before analyzing overshoot degree years and 'Paris-compatible' emissions scenarios.

The paper is well-written and provides a valuable reference for elucidating the IPCC scenario-emissions process. I would recommend publication with a few qualifications below to better emphasize the novelty of this contribution (for instance fore-fronting the statement in lines 245-248).

General

- This paper read to me as part review/part analysis/part overview of a new community tool, which is a lot to take on but is very useful to the climate community at large. My recommendation would be to highlight the community tool more clearly throughout the methods section to encourage its uptake. This could include providing a schematic of the workflow either in the main text or supplement or clarifying throughout the methods section how and where the *climate assessment* workflow package was used. I'll note that while the workflow illustrated in Figure 1 is excellent, it is more supportive of the review portion of the text as opposed to elucidating the packages, emulators, and analysis included in the community tool.

- Why aren't CICERO-SCM results reported in the abstract? Or make it clearer that it is used only for sensitivity analysis.
- Suggestion: In addition to Table 2 in the Supplementary file, a bar graph displaying the vetting 'success' of scenarios from each model would be useful. It would emphasize the number of scenarios that are included by a disproportionate number of IAMs (as discussed in section 5.1.1).
- It is exciting to consider the use of emulators for variables beyond global estimates of GSAT, but other variables have not yet been comprehensively evaluated, such as precipitation. Should there be some discussion of the uncertainty and potential of emulators to provide societally relevant metrics beyond GSAT? Similarly, more discussion of the regional emissions data vetting and application would be useful as a means of underpinning the recommendation in the concluding sentence.

Specific

- Line 300: delete in: '...climate mitigation options [in] were extensively...'
- Line 490: Chen et al. 2021 not included in the references
- Style: Remove the indent from lines 219, 223, 226, 228
- Line 252: "A growing body of research has been developed to describe[ing] analyses that compare..." (Or something along these lines)
- Line 296: italicize 'climate assessment' as is done on line 814
- Line 300: delete 'in': "Global scenarios used to assess climate mitigation options [in] were extensively..."
- Line 444: delete 'above': "Beyond these, AR6 WGIII includes categories [above] relevant for higher emissions scenarios that..."
- Line 765: delete 'a': "While overshoot indicators like ODY₅ may immediately be [a] useful as an..."
- Supplement: Include the number of scenarios considered in Table 2.