

Interactive comment on “The Scenario Model Intercomparison Project (ScenarioMIP) for CMIP6” by Brian C. O’Neill et al.

Anonymous Referee #1

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This paper describes the process for, and the selection of, policy-relevant scenarios for CMIP6. This is a major high-profile MIP that directly feeds into assessments of future climate change, such as those that will be produced by IPCC AR6. The scenarios trickle down to national assessments and hence have a relatively long lifetime and a wide reach.

I am afraid I have some rather fundamental problems with the approach this group are taking. The COP21 Paris Agreement represents a major global policy response to the issue of climate change. It perhaps represents the biggest and most high profile impact of science on policy in history. Yet this project barely mentions it. The only account taken is in some low-priority Tier 2 experiments described on page 14.

I think this sends out a very poor message to world from the science community. It

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could be interpreted as a scientific disbelief in limiting warming to 1.5 or 2 degC . It says that we believe that the Paris agreement will ultimately fail and that 'business-as-usual' is the most likely scenario for the future. Having fought so hard to get the politicians to recognize the value of our science, we do not believe in their policy response.

I am sure that it will be a challenge for the world to hit the Paris targets, so maybe the group is being realistic in selecting some of the very high-end scenarios. However, I stress again that this sends out a very poor message. Modeling groups will invest considerable time and effort into running these scenarios and they will be a major feature of IPCC AR6. Funders will ask why there is such a disconnect between policy and the scenarios. Perhaps the timing of the Paris Agreement was not ideal for this group, but to give it such a low billing shows disdain for the political process.

I expect the authors will argue for consistency between CMIP5 and CMIP6 in adopting the RCP levels of radiative forcing. But, in terms of comparing generations of models, there are plenty of experiments that have been run across many generations of CMIPs that enable this. The argument for consistency would have to relate to some consistency within policy discussions. I do not see why a policy maker would be spending their time worrying about the difference between SSP5-8.5 and SSP3-7.0 when they will be putting all their effort into worrying about how to limit warming to 1.5/2 degC.

I am also sure the authors will argue robustly against any fundamental change of approach at this stage of the whole complex CMIP6 process as there is virtually no time to produce an alternative plan. If they do then I think the paper needs some pretty clear and strong arguments for going with the very high-end scenarios and also why it does not consider scenarios that would limit warming to 1.5 and 2 degC.

Further Comments

Section 2.1 is perhaps interesting if you are into committee structures, but I do not think it is particularly relevant for the paper as a whole. It could be reduced considerably.

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Section 2.4. Many of the scientific questions addressed here are perennial; differences between similar scenarios, pattern scaling, emergent constraints. These can be addressed using CMIP5 models and, in some cases, the 1% per year CO₂ experiments. What is new here? I would have liked to have seen a new set of scientific questions articulated and, moreover, a set of questions that have direct relevance to the policy landscape. This is arguably the most policy-relevant MIP but it seems to be addressing questions that are of more interest to a climate scientist like me.

Will SSPx-y include BECCs and geoengineering aspects?

The initial condition ensemble is targeted at the wrong scientific questions. The most pressing scientific question around signal-to-noise is the difference between a 1.5 and 2 degC warming scenario. The policy implications of the two scenarios are quite different so it would be useful to know if we can actually distinguish between the climate impacts of them.

Section 3.3.3 on relationships to other MIP projections maybe premature as these groups would not have finalized their experimental design yet.

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