

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

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Comments on O’Neill et al., “The Scenario Model Intercomparison Project (ScenarioMIP) for CMIP6”

The paper clearly describes the ScenarioMIP design. Below are some comments about the forcing factors and definitions of radiative forcing that I hope the authors will consider and find helpful.

How is radiative forcing (e.g., Page 7 line 21) defined in relation to the SSPs? Is it 'Effective Radiative Forcing' or just 'Radiative forcing'? This should be clarified as there are different definitions of radiative forcing. See Section 8.1.1 in Myhre et al., IPCC, 2013.

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Are the forcing values for 2100 associated with the SSPs (e.g., 4.5Wm<sup>-2</sup>, 6.0Wm<sup>-2</sup> etc) just from anthropogenic factors? If the recommended future solar and volcanic forcing factors are not included in the numbers, it could mean the radiative forcing for the future won't actually match what is expected.

The Figure 2 "Total Radiative Forcings" panel does not appear to have any natural (solar or volcanic) forcing variations in the past or future periods, however the "Temperature change" panel does have past volcanic forcing variations in it. Should the radiative forcing and temperature panels include the past and future volcanic and solar radiative forcing variations that are proposed?

The future volcanic forcing (lines 17-19, page 20) is described as "ramped up" from the historical period in 2015 for the following 10 years. Should the impact on the analysis of MIPs that require simulations up to 2020 be considered? For instance DAMIP will require historical simulations be extended to 2020 (via ssp245). Delaying the "ramp up" could avoid the issue (e.g., Fig 14 in Jones et al., GMD, 2011).

Are the authors aware of the unusual total solar irradiance being proposed for the future period (Lines 15-17 Page 20)? The proposed decline in TSI over the period and inconsistent magnitude/phase of the solar cycle may make comparisons with CMIP5's RCP simulations a little bit more difficult than expected. Additionally a more appropriate reference for the implementation of the future solar irradiance may be Matthes et al, "Solar Forcing for CMIP6", 2016 [to be submitted to GMD].

Given the ease of use of simple climate models (e.g. temperature panel in Fig 3), it would be useful to see the expected impacts of some of the choices with respect to what was done for CMIP5. For instance what is the expected impact of the proposal for future natural forcing factors on the global temperatures?

There appear to be two "Riahi et al., 2016" in the references list. Are both referred to in the text?

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