

Geosci. Model Dev. Discuss., referee comment RC2
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Comment on gmd-2020-428

Anonymous Referee #2

Referee comment on "The SMHI Large Ensemble (SMHI-LENS) with EC-Earth3.3.1" by
Klaus Wyser et al., Geosci. Model Dev. Discuss.,
<https://doi.org/10.5194/gmd-2020-428-RC2>, 2021

Review of The SMHI Large Ensemble (SMHI-LENS) with EC-Earth3

This paper is written as an overview/introduction to the SMHI-LENS. The paper is well written and provides a sufficient introduction to this model. However, the paper misses some relevant literature in the introduction, need some more detail on the initialization of the ensemble and could use minor changes to the Figures to help with interpretation by the reader. I recommend that the paper is revised before it is accepted.

Comments are as follows

Section 1:

While this provides a good introduction, it is unclear why the authors cite specific large ensembles and not others (see line by line comments).

The introduction would benefit from a paragraph describing some of the interesting work already done using large ensembles. While the literature is too large to include everything, some references perhaps relating to what is shown later in the manuscript, or a brief introduction to new science done with large ensembles should be included.

Section 2.2 Initial conditions:

Please include the specific years that you used for the initial states in a table.

Figures: are rainbow colorbars the best choice? Perhaps you can find a better colorbar

F2 – poor quality and fuzzy

two orange colors are difficult to distinguish by eye on my computer screen

F6 – b) the orange line seems to come from nowhere

c) I don't see the orange line at all

perhaps different symbols or dots, dashes could be used so we can see all colors

F7 – Please describe in the caption how you compute the 10 member result. Do you pick one set of 10 members or resample 10 members many times?

Given most large ensembles have 30 members, as you note in your introduction. It would be good to do this for 30 members as well as 10 members and add a panel to the Figures. Would it be worth considering precipitation for these Figures as well given the pathway dependence of this variable:

e.g <https://journals.ametsoc.org/view/journals/clim/30/11/jcli-d-16-0441.1.xml>

<https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2016GL070869>

<https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2018JD028821#:~:text=We%20find%20a%20robustly%20larger,GHG%20across%20all%20available%20models.&text=This%20is%20because%20of%20a,by%20the%20GHG%20atmospheric%20forcing.>

Line by line comments:

Line 34- This is also shown using large ensembles in the following two papers:

<https://esd.copernicus.org/articles/11/491/2020/>

<https://iopscience.iop.org/article/10.1088/1748-9326/ab7d02/pdf> – this could also be compared to the results on line 185-186 in the discussion

Line 46 – MPI-GE is not MPI-ESM-LR but MPI-ESM1.1 – additionally the correct acronym for this large ensemble is MPI-GE not MPI-ESM-GE

Line 46 – I am confused about the choice of models introduced here. The large ensemble archive introduced by Deser et al 2020 includes more models, why not introduce all of the ones in this archive?

Line 51 – Also GFDL-SPEAR is now available online:
<https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2019MS001895>

Line 70 – RCM large ensembles already exist. It would be worth citing these here:

<https://journals.ametsoc.org/view/journals/apme/58/4/jamc-d-18-0021.1.xml>

106 – is there a citation for SSPs and ScenarioMPI?

155- I believe this is usually called TAS? Would it be more understandable to use the standard acronym – also please be consistent as you use tas in Figure2's caption

163 – perhaps 3K and higher is better wording

163 – 'the' northern hemispheric

173 – is increasing □ 'increases'

177 – should this be 'divided by'?

221 – it would be interesting to add whether the Aleutian low is too pronounced in all ensemble members as we would not expect observations to agree with the ensemble mean. This applies for all the metrics discussed on these lines.

236 – however this result contrasts with the following work, which should be added on this line

<https://journals.ametsoc.org/view/journals/clim/30/11/jcli-d-16-0441.1.xml>

509 – specify what the nino3.4 region is

