

Clim. Past Discuss., referee comment RC1
<https://doi.org/10.5194/cp-2022-55-RC1>, 2022
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Comment on cp-2022-55

Anonymous Referee #1

Referee comment on "Quantifying the contribution of forcing and three prominent modes of variability to historical climate" by Andrew P. Schurer et al., Clim. Past Discuss., <https://doi.org/10.5194/cp-2022-55-RC1>, 2022

This study used particle filtering to nudge a climate model to follow the observed variability of NAO, ENSO and SAM. The paper is well written and a nice contribution to the scientific literature. I think this paper can be accepted with minor revision, however, I make some major comments below in regards to colors and clarity of the Figures that need to be addressed before publication. I also make minor comments largely on literature that may be missing from the introduction/discussion. While not all papers suggested below need to be cited by the authors – I suggest the authors read the suggested literature and make their own decision whether it should be included.

Major comments:

Line 104 – how does the choice to stop the simulations on April 1 affect the results? Would the results differ if you used a different month?

Figures – in general the use of red and green is not good for colorblind people. Please update the colorschemes. There are online tools to check whether a Figure is readable if someone is colorblind.

Figure 3 – the red and green and black lines are hard to distinguish – perhaps the use of dots or dashes for those plotted on top of others would help.

Figure 4/5 – I recommend adding panels where differences are taken – this would be much easier to interpret

Figure 6 – Why are you looking at boreal winter alone?

The bottom two panels are hard to interpret – would smoothing help?

Figure 7 -

The caption says this is Annual and DJFM but I only see one result.

There is currently no panel (g)

Minor comments:

Line 35 – should also cite the original paper by Hawkins and Sutton, 2009:
https://journals.ametsoc.org/view/journals/bams/90/8/2009bams2607_1.xml

Line 45 needs citation:

Some options:

<https://www.nature.com/articles/s41558-020-0731-2>

<https://link.springer.com/article/10.1007/s00382-010-0977-x>

Overview of large ensemble literature – could be useful for lines 40-45:

<https://esd.copernicus.org/articles/12/401/2021/>

Line 80 – first thought is can we really trust data from 1781 – I see later you use reconstructions, this is great but perhaps needs to be mentioned earlier on line 80.

Line 118 – remove repeated word “schematically”

Line 225 – tell the read which color this is in brackets for ease of interpretation

Line 299 – could this lack of variability in the Southern Ocean be due to the coarse resolution of the model?

Section 3.3 either be clear that you refer to only tropical eruptions or add citations for high-latitude eruptions: some are as follows

<https://www.pnas.org/doi/10.1073/pnas.1509153112>

<https://esd.copernicus.org/articles/12/975/2021/>

<https://www.cesm.ucar.edu/projects/community-projects/LME/publications/Stevenson-JClimate-2016.pdf>

Line 316 – another possible citation

<https://www.nature.com/articles/s41467-022-28210-1>

Section 3.3 – there is a review on this topic:

<https://agupubs.onlinelibrary.wiley.com/doi/chapter-epub/10.1002/9781119548164.ch12>

Line 354: Does this relate to these results:

<https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2015GL066608>

Line 363 – can you say why?