



EGUsphere, referee comment RC1  
<https://doi.org/10.5194/egusphere-2022-387-RC1>, 2022  
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## **Comment on egusphere-2022-387**

Anonymous Referee #1

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Referee comment on "A modeling framework to understand historical and projected ocean climate change in large coupled ensembles" by Yona Silvy et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-387-RC1>, 2022

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### General comments:

The manuscript describes and validates a modeling framework for investigating transient ocean climate change in the IPSL model. In general, the paper does a good job describing the model. However, some parts of the validation (particularly the Passive Tracers part, section 5) need more validation. It would also be helpful to the reader if the authors included more details on the scientific goals of this model. This seems to be mainly included in a separate, in review article. However, without some idea of the scientific goals, it is difficult to assess if the model set up can achieve those goals. For example, the authors do not include interactive sea ice, and yet they are investigating the timing of trends in temperature and salinity. I would expect that melting sea ice impacts T and S trends, at least in some regions. The authors need to better justify why sea ice would not impact whatever question they are investigating. The formatting and writing of the manuscript are clear. With revisions, the manuscript could be publishable.

### Specific comments:

Line 65: The authors do not use coupled sea ice in the model. Perhaps this is ok, depending on the scientific question, but it is difficult to evaluate as they never state a scientific question. More details on the intended use of this model is would be helpful.

Line 70: Is the 2000 years the spin up, or is it run for 2000 years after spin up?

Line 71: what is ssp245? Perhaps include a citation

Line 72: "isolate the mechanisms responsible for temperature and salinity TRENDS"? Not sure what this sentence means without "trends" added to it

Line 77-79: Why is it crucial to compare simulations with the same background internal variability? Perhaps it is important for what the authors are investigating, but I do not know what they are investigating so this statement confused me. It seems to me that it would be much more realistic to couple the ocean to the atmosphere. Please provide more justification for why this scientific question cannot be done with a coupled atmosphere.

Line 90: Why monthly-mean anomalies? Again, this may be appropriate for the scientific question, but I don't know what the scientific question is.

Line 96-98: Are you assuming that HEAT, STRESS, and WATER are all linear?

Line 141: Is this slight difference in a figure somewhere?

Figure 2: There are many acronyms on this that I cannot find defined in the paper (e.g. ORCHIDEE, PISCES, LIM3, LMDz, OPA). Please define in the figure caption, or somewhere else in the manuscript.

Figure 2: Is the Chlorophyll forcing used? I thought that biogeochemistry was not included in the model version used (e.g. line 65)

Line 169: Does use of monthly means make a difference for ALL?

Line 251: What are the "scientific questions we aimed to answer" ? I would expect that the timing of things like warming of the ocean may depend on having interactive sea ice. Please provide justification that no sea ice is needed for the scientific questions.

Line 310: What is the "purpose of the intended study"?

Figure 7: Differences appear very large in some areas (mostly Arctic, as well as high latitude N Atlantic and some of the Pacific). It is difficult to assess if this matters since I do not know exactly what the authors intend to investigate as their scientific question.

Line 423-425: What is this work designed to study?

Line 434-435: Are there citations of these previous experiments?

Section 5 ("passive tracers"): This section is intended to validate the passive tracers. However, there are no figures to illustrate that the tracers work as intended. Recommend adding at least one figure to illustrate that the passive tracers work as they are meant to.

Line 553-554: You have different scientific questions than FAFMIP. What are your scientific questions? What are those of FAFMIP? How are they different?

Line 561: "This question of timescales is precisely the novel aspect we aim to tackle with this present study": timescales of what? Will sea ice melting potentially impact this timescale? What region are you planning to look at?

I selected "poor" for reproducibility as the manuscript currently does not comply with the journal's "Code and data availability" policy.