

Clim. Past Discuss., author comment AC1
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Comment on cp-2022-63

Zhiyi Jiang et al.

Author comment on "No changes in overall AMOC strength in interglacial PMIP4 time slices" by Zhiyi Jiang et al., *Clim. Past Discuss.*, <https://doi.org/10.5194/cp-2022-63-AC1>, 2022

We would like to thank the two reviewers for their efforts reading and commenting on our research. They make several suggestions of ways that we could improve the manuscript. We intend to implement many of them, and are taking this opportunity to outline our proposed responses.

Both reviewers expressed surprise, and also some concern, at the large spread in amplitude of the AMOC strengths in the preindustrial control simulations. This is an unfortunate feature of the wider CMIP6 and CMIP5 ensembles (e.g. Xie et al., 2021). Disappointingly the uncertainty in modern-day oceanographic observations is such that none of the simulations can be categorically ruled out (Frajka-Williams et al., 2019; Beadling et al., (2018)). In a revised manuscript, we would incorporate a discussion evaluating the models against modern-day observations based on results in the published literature. We would also look at alternative approaches to plot this information to provide a clearer visualisation of the AMOC changes – for example, using multiple histograms. We had included the previously published scatterplot from Brierley et al (2020), but clearly this was not properly explained, and we would aim to do better in a revised version.

One of the reviewers has suggested that using spectral analysis can be more accurate in estimating low frequency variability of AMOC. We have already performed the power spectral analysis. However, some models have relatively short simulation years, it is difficult to visualise, especially when trying to figure out the lowest frequency in the simulation by looking at the plot. Hence, we decided to use the Pearson's r to evaluate whether the simulation has substantial low frequency variability or not. Moreover, the reviewer was concerned that the length of each simulation can affect the significance of the Pearson's r . In response to this, we have computed the p -values of the correlation coefficients and they are statistically significant (apart from the FGOALS-f3 PI experiment whose r value is not statistically significant, possibly due to the short run length of just 50 yrs, as we use historical experiment in this model to substitute the PI experiment (see Tab 1 captions)).

For Sect. 4.2, one reviewer suggested that we should shorten this part and focus more on the AMOC itself as expected from the title, while the other reviewer wanted more investigations on the AMOC's impacts on tropical precipitation centre. Considering both comments, we will have more concise descriptions on the AMOC's fingerprint in the revised manuscript, but also investigate more on the impacts of AMOC changes on the shifts in precipitation centre (e.g. by regressing the changes in the core location of the ITCZ onto the AMOC changes, etc.). However, how the sea-ice would respond and potentially feed back to the AMOC changes are for future work, as our current approach is not sufficient to identify the direction of any feedbacks.

We apologise for having only written a cursory discussion of the existing literature on proxy data. In a revised Sect. 5, we will add further detail on the palaeo-data side using the existing literature of more detailed modern oceanography studies. Meanwhile, we will add all the references when referring to the existing palaeo data base.

For all other comments (such as the 'rationale for choosing the timeslice'), grammar and spelling mistakes, explanation for a specific sentence, etc., we will make corrections and add explanations for them.