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Climate of the Past Discussions

Interactive comment on "Mid-pliocene Atlantic meridional overturning circulation not unlike modern?" *by* Z.-S. Zhang et al.

Anonymous Referee #1

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Zhang et al. do a good job of summarizing the results of the first phase of the Pliocene Model Intercomparison Project, specifically the evaluation of AMOC and OHT from the 8 coupled models that participated in experiment 2. PlioMIP is the first attempt at a systematic MIP for the mid-Pliocene and the group has been extremely productive. The paper is clearly organized, points are referenced appropriately, and the figures and tables are necessary and of high quality.

I'm not sure how useful my comments will be because they do not provide a clear problem to be fixed. First let me say that regardless of the semi agreement among some of these PlioMIP simulations, the conclusion that the Pliocene North Atlantic Ocean was not demonstrably different than the present day, flies in the face of a tremendous amount of proxy data. As someone with a fair bit of experience in the North Atlantic, I

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can tell you that the faunas, benthic and planktic, show marked changes as does the chemistry of the bottom waters. I realize this isn't much of a comment for an author to be able to respond to, but at the least I would go back and reword things a bit.

You cite Lawrence et al., Naafs et al. and several of the PRISM papers (Dowsett et al.) as reconstructions. I'd be very careful. Those first two references are technically reconstructions but you are looking at individual sites, in high resolution, over several million years. The PRISM reconstruction is basically a time slice (or slab). Comparing the three of them is somewhat mixing apples and oranges. Lawrence et al. barely gets back to the interval of time the authors were attempting to simulate. The PRISM reconstruction is an average of interglacials (for want of a better word) over 240,000 years.

The conclusion has two troubling points. (1) the Pliocene was not unlike the modern. Back to my first statement above. Take a look at the actual data and you would find it difficult to support such a statement (your simulations not withstanding). You place a lot of weight in the Hodell data set... (2) You do mention this in your discussion but from a readers standpoint, you seem to neglect at least two of the simulations that are contrary to your conclusion. I'm not sure how you can do this? If we are to learn from these fantastic model experiments, I think we need a much more in-depth discussion of why two, maybe three? of the simulations do not show what you are concluding. What is different about those models? There must be other applications of all 8 models that would lend insight into why things are coming out the way they do.

Interactive comment on Clim. Past Discuss., 9, 1297, 2013.