

Clim. Past Discuss., referee comment RC2  
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## Comment on cp-2021-58

Anonymous Referee #2

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Referee comment on "Reduced El Niño variability in the mid-Pliocene according to the PlioMIP2 ensemble" by Arthur M. Oldeman et al., Clim. Past Discuss.,  
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This paper provides a comprehensive discussion of ENSO variability in the new PlioMIP2 ensemble. The changes in ENSO amplitude, frequency and spatial pattern and the relationship with mean state changes are all evaluated and compared with proxy records and other modelling studies. The results will be of wide interest. The paper is fluently written and well structured. The model evaluation uses a thorough and logical methodology in all sections. I recommend the paper for publication subject to minor revisions outlined below.

Specific comments:

- Model names: The model names in Table 1 are not the same as the names in Table 2 and throughout the paper. I suggest using the standard CMIP5/CMIP6 names throughout to avoid confusion.
- Introduction, line 24 onwards: The discussion of mid-Pliocene CO<sub>2</sub> levels is a bit misleading as the de la Vega study found that "CO<sub>2</sub> ranged from 394 (+34/-9) ppm to 330 (+14/-21) ppm: with CO<sub>2</sub> during the KM5c interglacial being 391 (+30/-28) ppm (at 95% confidence)." Therefore, for the PlioMIP2 interval, the new estimates overlap with the value of 400 ppm given in the earlier studies. Haywood et al. (2016) could also be cited here for providing a discussion of the range of CO<sub>2</sub> estimates – their discussion also concludes that the various CO<sub>2</sub> estimates generally overlap.
- Section 2.1: It should be mentioned here that the PlioMIP2 Eoi<sup>400</sup> simulations are configured to represent the KM5c interglacial at 205 Ma, and that this interval has an orbital configuration close to the present day allowing models to use the same orbital parameters as for the pre-industrial simulation.

Technical corrections:

- Line 37: change "increases with" to "increases by".
- Line 67: change "accompanied with" to "accompanied by".
- Line 106: change "will be" to "are" and delete "will" before "conclude" for consistency with tense in the rest of this paragraph.
- Line 217: Suggest change subsection 3.1.1 title to "Statistical moments" rather than "Moments".
- Line 371-372: Suggest summarize the comment on the MRI2.3 zonal SST gradient here, e.g. "due to the overly westward extent of the cold tongue in the MRI2.3 model discussed above".
- Line 397: Change "alike" to "like".
- Line 461: Insert "when comparing mid-Pliocene and pre-industrial ENSO" after "robust signals".
- Line 512: Change "great similarity for" with "great similarity between".
- Line 547: change "composition makes that" with "composition means that".
- Figures: Axis labels are very small, consider increasing font size.
- Figures: The use of red-green color scheme may not be suitable for colorblind readers. Perhaps use red-blue instead.
- Figure 1: Make Nino box lines thicker as they are hard to see.
- References: Check reference formatting as some information is duplicated.