

Clim. Past Discuss., community comment CC1
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Comment on cp-2022-72

Arthur Oldeman

Community comment on "On the importance of moisture conveyor belts from the tropical eastern Pacific for wetter conditions in the Atacama Desert during the mid-Pliocene" by Mark Meyers et al., Clim. Past Discuss., <https://doi.org/10.5194/cp-2022-72-CC1>, 2022

Dear authors,

You submitted a nice work to CP, advancing the science on the mid-Pliocene hydrological cycle. So well done! I do think that your work misses some key background information on the mid-Pliocene (Pacific) hydrological cycle, based on recent PlioMIP2 publications.

- The mid-Pliocene simulations of CESM2 you are using are further analysed in Feng et al 2020. They specifically also look at the tropical Pacific circulation changes, so Hadley & Walker circulation and equatorial Pacific SSTs. <https://doi.org/10.1029/2019MS002033>
- An evaluation of the large scale hydrological cycle response in PlioMIP2 (including the CESM2 simulations) is included in Han et al 2021. They find wetter conditions in the deep tropics, so Pacific ITCZ, and give an explanation for where this moisture is coming from. <https://doi.org/10.5194/cp-17-2537-2021>
- Pontes et al 2020 research PlioMIP1 and PlioMIP2 results and find a northward shift of the ITCZ and a weakened and poleward displaced South Pacific Convergence Zone (SPCZ). These results might again be relevant for where exactly the moisture in the atmosphere is coming from in your region of interest. <https://doi.org/10.1038/s41598-020-68884-5>
- Related but maybe less relevant is Gabriel Pontes' recent publication, relating the northward shift of the Pacific ITCZ to the reduced El Niño variability in the PlioMIP1 and 2. <https://doi.org/10.1038/s41561-022-00999-y>
- A very relevant study, using PlioMIP2 model CCSM4-UoT (so not CESM2) is Menemenlis et al 2021, where they study and attribute precipitation changes in the mid-Pliocene, a.o. focusing on the coastal area of Chile. They explain & attribute the precipitation changes to dynamical changes in atmospheric rivers. <https://doi.org/10.1016/j.gloplacha.2021.103557>

I saw you do include my 2021 paper on reduced El Niño variability in the PlioMIP2 ensemble (Oldeman et al). I think that most papers I refer to above are actually more relevant to your study than that article, since these focus more on atmospheric dynamics and the hydrological cycle rather than SST variability.

Your work is interesting but lacks - in my view - some relevant background knowledge on the hydrological cycle and atmospheric dynamics from modelling studies. I would recommend including some of the content of these publications either in the Introduction, or section 3.2 Potential drivers.

Technical comment: you consistently refer to "PlioMIP" in the Methods section. CESM2 was included in phase 2, so PlioMIP2. It would be good for findability to use PlioMIP2 (just as you are using CMIP6 and PMIP4 rather than CMIP or PMIP).

Much of luck with the research!

Best regards, Arthur Oldeman