



EGUsphere, referee comment RC1
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Comment on egusphere-2022-197

Anonymous Referee #1

Referee comment on "Impact of an acceleration of ice sheet melting on monsoon systems" by Alizée Chemison et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-197-RC1>, 2022

The authors explored the impacts of ice sheet melting on global monsoon system in the 21st century under the RCP8.5 scenario. They conducted freshwater hosing experiment with IPSL-CM5A-LR in which freshwater is input in the North Atlantic and around Antarctic to mimic the freshwater discharge due to Greenland and Antarctic ice sheet melting. They found an AMOC slowdown and resultant southward shifts of the American and African monsoons. They also found that the North African monsoon generates a drier condition in boreal summer and the South African monsoon strengthens in austral summer, however, changes in the Asian and Australian monsoons are insignificant.

This study focuses on an interesting topic and potentially contributes to our understanding of the impacts of Greenland and Antarctic ice sheet melting on global monsoon system during the 21st century. Overall, the analysis is comprehensive and the results are convincing. Thereby, I would like to recommend publication pending on minor revisions.

Major comments

- The authors may want to clarify how many ensemble members are used/produced for their historical, RCP8.5, WAIS3m, GrIS1m and GrIS3m simulations. I believe that there are multiple ensemble members for IPSL-CM5A-LR historical and RCP8.5 simulations available at the CMIP5 archive. Also, are the results (e.g., Figures 2-9) based on the ensemble-mean of simulation? Besides, how will the results be affected by model resolution considering the relative low ocean resolution of IPSL-CM5A-LR? In another word, for WAIS3m, if fresh water is released into the western Antarctic Ocean in a high-resolution model (e.g., 0.1-degree ocean), how will the results change?
- Section 3.2 and Figures 4-5: I am wondering whether the authors can also show the changes in Arctic and Antarctic sea ice, which might help understand the changes in surface temperature and perhaps others.
- I am wondering whether Greenland and Antarctic ice sheet melting will affect the seasonal delays of precipitation that is related to the monsoon system (e.g. Song et al.

2021).

Song, F., Leung, L.R., Lu, J., Dong, L., Zhou, W., Harrop, B. and Qian, Y., 2021. Emergence of seasonal delay of tropical rainfall during 1979–2019. *Nature Climate Change*, 11, 605-612.

Minor comments

- Lines 10-11: I suggested changing the sentence as “ Changes in the North American monsoon occur later, while changes in the South American monsoon start earlier.”
- Lines 38-39, Line 132, Line 195, Line 216 and many others: Please use “northern hemisphere”, “Northern Hemisphere”, “southern hemisphere” and “Southern Hemisphere” consistently through the text.
- Line 124: Temperature and precipitation changes outside the North Atlantic region could also be modulated by the Pacific meridional overturning circulation in paleo-climate (e.g. Liu and Hu 2015).

Liu, W. and Hu, A., 2015. The role of the PMOC in modulating the deglacial shift of the ITCZ. *Climate Dynamics*, 45, 3019-3034.