

Geosci. Model Dev. Discuss., referee comment RC2
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Comment on gmd-2021-346

Anonymous Referee #2

Referee comment on "Embedding a one-column ocean model in the Community Atmosphere Model 5.3 to improve Madden–Julian Oscillation simulation in boreal winter" by Yung-Yao Lan et al., Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2021-346-RC2>, 2022

This is a very well written paper providing comprehensive testing on how air-sea coupling can improve simulations of the Madden-Julian Oscillation (MJO) in the CAM5 AGCM, such as role of the vertical resolution and depth in the ocean model, coupling domain, and diurnal coupling. While findings from this study largely support previous studies, they provide important guidance in designing an optimal air-sea coupling strategy for improved MJO simulations. I would be glad to recommend this manuscript for publication after a minor revision.

Minor comments:

When describing model results, I would suggest to use "present tense" instead of "past tense" throughout the paper.

Line 37: move "in the year 2011" after "Dynamics of the MJO"?

Line 68: may delete "and climate models"

Line 109: may change to "regarding the effect of air-sea coupling on the MJO"?

Line 273-274: Are U850 anomalies not averaged over 10N-10S, instead of just on the equator?

In general, figure quality can be improved (many look blur with details difficult to identify), and some figures can be a bit enlarged.

Line 305: the "observed" MJO characteristics

Line 467: in the first few meters "below the surface" allows?

Line 556: I didn't see faster MJO propagation when the diurnal coupling is turned off based on Fig. 9b. If compared to Fig. 5a, seems to me the MJO propagation speed is even faster in the C-30NS run with diurnal coupling. This is also related to the following comments on Fig. 10. Generally, I don't see significant differences in MJO simulations between the no-diurnal coupling experiment and the control experiment.

Fig. 10: It would be better provide more details on how the U850 and P slopes are determined, e.g., based on which longitude bands. Also the colors for "C-30NS-nD" are not consistent between the figure and legend.