

Dear GMD's Editors and Anonymous Referees:

We greatly appreciate the reviewers insightful and helpful comments regarding our manuscript. The manuscript has been revised based on reviewer's comments Below are the point-by-point replies to reviewer's comments and concerns.

Sincerely,

Yung-Yao Lan, Huang-Hsiung Hsu and Wan-Ling Tseng

Anonymous Referee #1

The reviewer comments are formatted in italics and the authors response to the comments are formatted in bold.

Notation *RC#I-P*. represents Reviewer Comment and Paragraph Number.

General major/minor comments:

RC#1-1. This revised manuscript has been significantly improved. Also my previous questions have been adequately addressed. I am happy to recommend this paper for publication after a very minor comment below:

One of the main results from this study is: "Our results suggest that spontaneous atmosphere-ocean interaction with high vertical resolution in the ocean model is the key to the realistic simulation of the MJO and should be properly implemented in climate models." I am not quite sure what exactly is the preferred coupling frequency with the "spontaneous atmosphere-ocean interaction"? Does this refer to the 30min coupling? I would suggest to put a more explicit statement on the preferred coupling frequency for MJO modeling rather than using "spontaneous". A similar statement was also found in the conclusion part.

Response:

Thank you for the suggestion. We changed it to “more spontaneous atmosphere-ocean interaction (e.g., ocean response once every time step to every three days in this study) with high vertical resolution in the ocean model ...”. Please see the abstract in the revised manuscript.

Anonymous Referee #3

comments are formatted in bold.

Notation *RC#3-P*. represents Reviewer Comment and Paragraph Number.

Major Comments:

RC#3-1. The experiment modulates the frequency of SST change shown by the atmosphere model. In this case, SST can be abruptly changed in low-frequency SST experiments. In the C-30 days experiment, SST is changed every 30 days, and the atmosphere affects it every 30 minutes. I think the unorganized convections shown in this simulation are mostly dominated by shock from abrupt SST changes. Please revise the overall results for low-frequency SST experiments with the impact of shock from the SST change.

Response:

Reviewer’s suggestion “the unorganized convections shown in this simulation are mostly dominated by shock from abrupt SST changes” is well taken and included in the revised manuscript. Because our study did not conduct specific experiments to fully explore this effect, we mentioned in the revision that this potential effect warrants further investigation. The following discussion is added in the Conclusions section.

“The second possible reason would be that the SST variation in an MJO event become more abrupt and may disrupt the large-scale nature of the MJO into disorganized spatial distribution in atmosphere, ocean, and the interface where rigorous heat exchange occurs. This disrupting effect of abrupt SST variation, which is not explored in this study, warrants further studies with purposely designed experiment to untangle.”

Minor Comments:

RC#3-2. Line 234-235: ‘stationary nature of simulated MJO’ has not been mentioned before. Adding (Figure 2 h-j).

Response:

We modified the sentence to “stationary nature of simulated MJO seen in Fig. 2i–j”.

RC#3-3. Figure 9: The color of A-CTL is not recognized, especially when I print it out. I recommend changing the color for A-CTL.

Response:

Thank you for your suggestion. We changed the color for A–CTL in Fig. 9 and Fig. 11. Please see the revised manuscript for the change.