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Interactive comment

Interactive comment on "Subseasonal Midlatitude Prediction Skill Following QBO-MJO Activity" *by* Kirsten J. Mayer and Elizabeth A. Barnes

Anonymous Referee #2

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This manuscript aims to assess the impacts of the QBO and MJO states on subseasonal prediction skills of midlatitude circulation. Interesting results are presented such as the difference in the sensitivity of prediction skill to the MJO state depending on the QBO state. I think this manuscript would further improve if the authors could provide more clarification to their methodology. I also suggest a few points for the authors to reconsider the interpretations and conclusions of the results below.

Comments

1. Section 2.3: I suggest the authors revise the method section to make it more accessible to a broader audience. The authors also jump into explaining the details of each analysis technique (i.e., STRIPES and ACC). Before jumping into the details, it would be helpful to the readers if the authors could first outline what they attempt to

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quantify and how it relates to the objective of this study. More specifically, I suggest the following points.

a. For readers who are unfamiliar with Jenney et al. 2019, it would be difficult to understand the STRIPES index. I suggest to move the Supplemental Figure S1 to the main manuscript and include further visual illustrations on how the STRIPES index is calculated.

b. I suggest the authors add more discussion on the novelty and benefits of STRIPES analysis. Why do the authors choose to use the STRIPES index to quantify the model's ability to represent MJO teleconnection instead of using some other simpler techniques (e.g., averaging absolute values of z500 anomaly composites based on RMM phases)?

c. Discussion on potential caveats of STRIPES analysis should also be included. For example, as discussed by the authors, the propagation speed of the MJO can change with the QBO. In such a case, using the same phase speed to calculate the STRIPES index could be problematic. Is the sensitivity to choosing different phase speeds tested?

d. Line 108: Please clarify what "the resultant vector" means.

2. Section 3.1: I was a bit confused about how to interpret the results in this section. The authors explain that Figures 1 and 2 represent the sensitivity of z500 anomaly to the MJO and QBO states. However, when the authors apply the normalization, the maps appeared noisier and no regions stood out to be "sensitive" to the MJO and QBO states (in Fig. 3). Does this mean that the regions of high values in Figs. 1-2 are just regions of greater variance in z500 and do not necessarily represent the high sensitivity to the MJO and QBO? I suggest the authors recreate Figs. 1 and 2 using normalized z500 anomalies (e.g., by the standard deviation of z500), which I think would be a more proper way to show the sensitivity of z500 to the MJO and QBO states.

a. And please clarify what "distinct stripes" on line 176 and "stripey-ness" on line 181

mean.

3. Section 3.2: There were many interesting results presented in this section, but some interpretations of the results must be done more carefully. One of the conclusions that the authors make is that the prediction skills increase during MJO active states when combined with WQBO more than with EQBO states (section 3.2.4). This could be because there is a greater difference in the MJO amplitude between its active and inactive periods during WQBO then EQBO. I suggest the authors check the average amplitude of the RMM index during the different combination states of the QBO and MJO. Another point to check is if the similar samples of different RMM phases are included in each combination of QBO and MJO states. If there are any skewness in the samples of RMM phases, that should be considered for the interpretation of the results.

4. Section 3.2.5: The authors could consider eliminating this section. I am not sure how much value is added by including this section. The general finding that is summarized in this section (i.e., no relationship between z500 sensitivity and prediction skill) could be summarized in a few sentences in the summary or conclusion section.

5. Lines 336-338: I think it would be nice to add more information/discussion on the dynamics behind the importance of WQBO state to the NAO and AR associated with the MJO that were found by these cited work (Feng and Lin 2019 and Baggett et al. 2017).