Responses to Reviewer #1

We appreciate the reviewer's encouragement and valuable comments for our manuscript. Our point-to-point responses are given below.

General Summary and Comments

With a set of comprehensive experimental design, this work studied the effects of air-sea coupling and ocean mean state in the boreal summer intraseasonal oscillation simulation. An interesting finding is that a cold ocean mean-state bias improved the simulated BSISO amplitude and spatial distribution by reducing overestimated subtropical summer mean rainfall, which results from the model systematic error. Although air-sea coupling captured correct SST-rainfall phase relationship, the current work shows that it has little effect in the BSISO northward propagating. This also makes incremental progress towards understanding such a debatable topic. The manuscript is well organized and the results are robust and clearly presented. I recommend the publication of this paper after my minor concerns below are addressed.

1. It is recommended to draw the grids of the axes in figures 4 and 5, so that the latitudes of the maximum centers can be easily recognized.

Response:

Good suggestion. The grids of both axes in Figures 4 and 5 have been added accordingly.

2. L207. I do not agree that rainfall and SST anomalies are out-of-phase over off-equatorial regions. since the zero contour lines of SST still locate near the maximum centers of rainfall (Figure 7f, g, h, k, l, m). Please consider adding the SST contours to figures 4 and 5, so that the associated propagations of SST and its phase relationship with rainfall can be clearly revealed.

Responses:

Yes, we agree with the reviewer that the intraseasonal rainfall and SST anomalies do not show a completely out-of-phase relationship over the off-equatorial western Pacific. However, the coupled models do capture the shift of the warm SST anomaly toward the suppressed convective region over the off-equatorial western Pacific (Figs. A1b and d), similar to the observations (Fig. A1a).

We have modified this sentence as follows: "Over the western Pacific, SPK reproduces the observed phase relationship between the convection and SST anomalies: a near-quadrature relationship over the equatorial regions (Figs. 7a–c), but a shift of warm SST anomalies toward the suppressed convective regions in the off-equatorial regions (Figs. 7f–h and k–m)." (Lines 220–222)

Following your suggestion, the SST anomalies were added to Figures 4 and 5 (as shown in Figs. A1 and A2 below) in the revised manuscript.

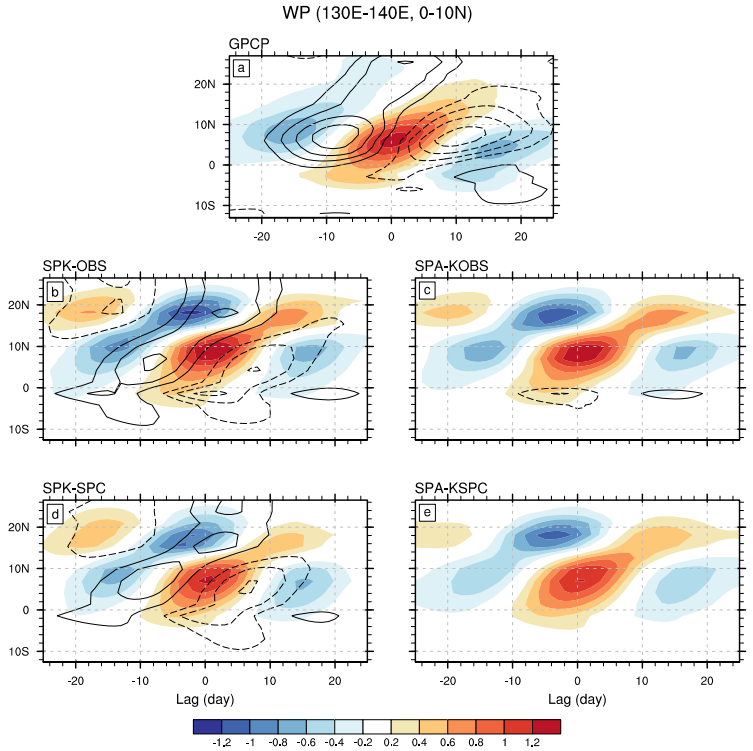

Figure A1. Lagged regression coefficients of 130°–140°E averaged intraseasonal precipitation (shading; [mm day^{-1}]/[mm day^{-1}]) and SST (contour; [ºC]/[mm day^{-1}]) onto (130°–140°E, 0°–10°N) averaged intraseasonal precipitation for (a) GPCP precipitation and ERAI SST, (b) SPK-OBS, (c) SPA-KOBS, (d) SPK-SPC, and (e) SPA-KSPC. The contour interval is 0.001 [ºC]/[mm day^{-1}]; the zero contour is omitted.

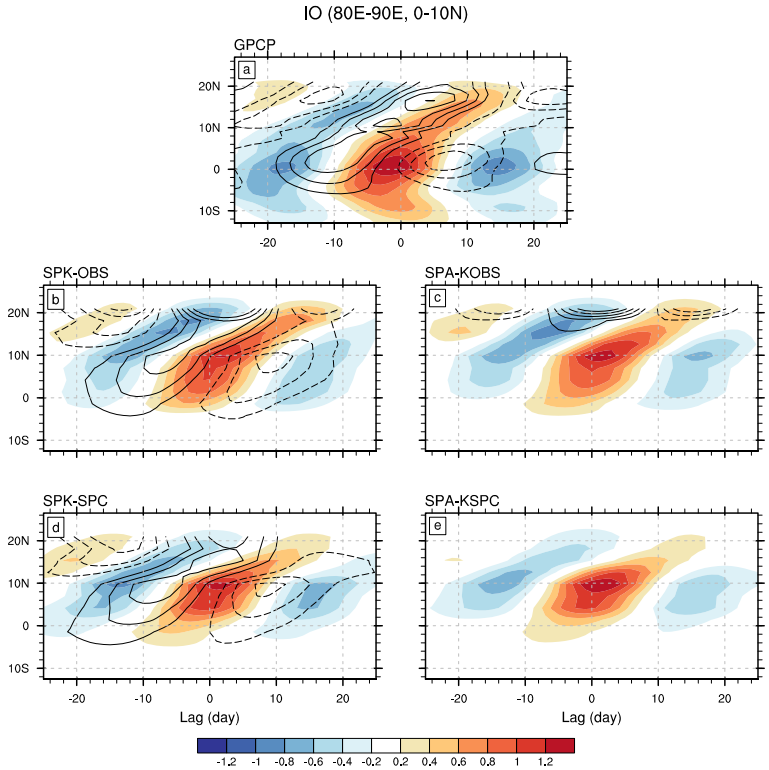

Figure A2. Same as Fig. A1, except for 80°–90°E averaged intraseasonal precipitation and SST regressed onto (80°–90°E, 0°–10°N) averaged intraseasonal precipitation.

3. L285. I don't think "large" is a nice adjective for "relationship".

Response:
Done.

4. L287-288. Please explain why "it is easy to surmise the effect of air-sea coupling on the amplitude of convection, while its effect on the propagation is not obvious". Is it because of the correct phase relationship, or is it from the shorter delay?

Response:
Thank you for pointing out this unclear description. To clarify it, we revised the sentences as follows: "As a consequence of the shorter delay, it is easy to surmise the negative effect of air-sea coupling on the amplitude of convection, while its effect on the propagation is not obvious." (Lines 300–301)