

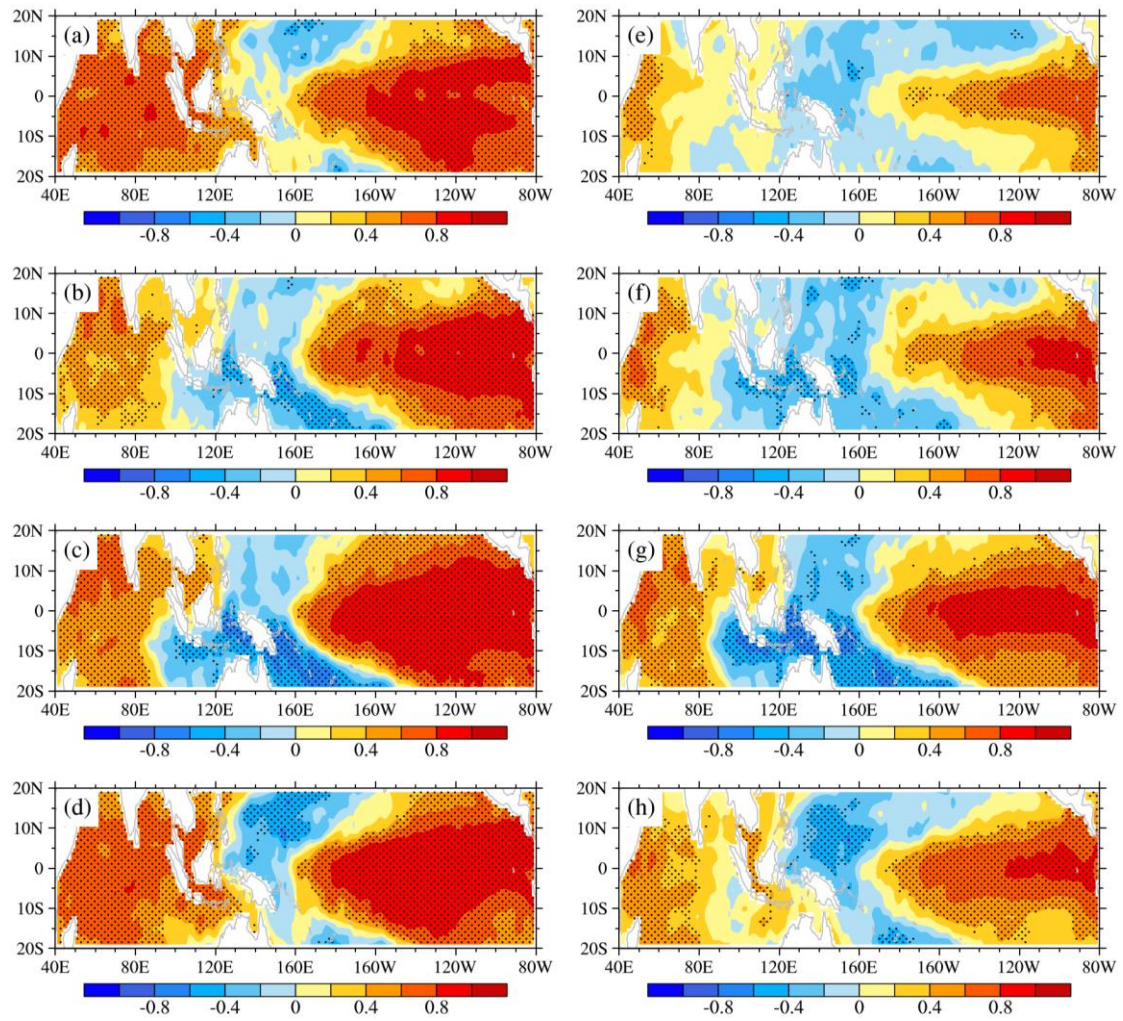
We thank the reviewer again for the constructive comments that help improve the presentation of the original manuscript. Below are our point-to-point replies to the reviewer's comments (original comments are in italics):

I thank the authors for their major revision of the paper and responses to the points made. It is much more suitable for final publication. The first reviewer's advice regarding seasonality has been very helpful, and the revision documents how the pattern of the EOF1 differs with season. From (new line) L137 and 3.2.1, it seems that the authors prefer a pattern that has both signs in the Indian Ocean, as in JJA and SON. (Regarding my point 21, this is winter and spring, on my side of the Equator, but the Journal's practice on this should be followed.) This prompts a second index, after PC1, which was found to better relate to Asia (L119). Unfortunately, the revision has largely disregarded my concerns (general comment, points 20, 25) about how these two indices for 'PIOAM' are presented. There is no mention of two indices in the abstract. The conclusions describe results from each form, but without acknowledging this.

Some further revision is needed, I think. If both indices are used, then this might be guided by previous papers. It seems the all-month PC1 will need to be retained, given its use in Fig. 3. The second index definition might be further justified as a practical one defined with boxes, following the approach of IOD, NINO34, etc. Are the two indices better correlated in JJA and SON? Would it be interesting to extend Fig 6 to four seasons?

Reply: Thank you very much for your comments and suggestions. We attach great importance to and seriously consider your comments, but we are sorry we didn't make the point-by-point reply clear. For points 20, we replied that the PC1 of PIOAM is compared with the alternative PIOAMI (the second index) by the Figure 6 in the revised manuscript, and the correlation coefficients between Nino3.4 and PC1 and PIAOMI are 0.95 and 0.68, respectively, indicating that PC1 is indeed more closely related to Nino3.4. For points 25, we apologize for misunderstanding the reviewer's concerns.

For Fig. 3, EOF analysis is used to investigate the spatial pattern in HadISST dataset and CMIP5 models, without using PC1. In fact, we don't use PC1 anywhere except in 3.2.1 when comparing PIOAMI (the second index) with PC1. We have explained it in the article, **please see lines 274-277**. The correlation coefficients between the two indices in MAM, JJA, SON and DJF are 0.45, 0.76, 0.87 and 0.71, respectively, which indicates that the two indices are better correlated in JJA and SON. In addition, the figures below show the regressions of the SSTA onto the normalized PC1 and PIOAMI in four seasons. It can also be found that the spatial patterns associated with PIOAMI (e-h) are closer to the typical spatial pattern of the PIOAM than that associated with PC1 (a-d). This part has been added to the revised manuscript, **please see lines 272-281**. Just as several indices can describe ENSO, the PC1 and the so-called PIOAMI can also describe PIOAM. However, in the present study, we believe that the so-called PIOAMI can better represent the PIOAM than the PC1. Therefore, we chose to use the so-called PIOAMI to investigate PIOAM in the following studies, instead of using the both indices. Furthermore, we emphasize the two indices in the abstract, **please see lines 16-18**.



Regressions of the (a, e) MAM, (b, f) JJA, (c, g) SON and (d, h) DJF SSTA onto the normalized (a-d) PC1 and (e-h) PIOAMI (unit: $^{\circ}\text{C}$). The stippled areas for SSTA denote the 99% confidence levels.