

”Inferring the role of Interdecadal Pacific
Oscillation phase dependencies and extratropical
internal variability on the tropics”
ref[egusphere-2025-3948]

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1 Overall response to reviews

Authors: We thank the reviewers for their comments, time and effort. In considering and responding to their feedback we are confident that the revised manuscript is much improved.

2 Response to reviewer #1

Reviewer #1 The manuscript addresses causal relationships between climate mode indices. Even assuming that statistical associations between indices reflecting very distinct spatial and temporal scales of variability is a valid exercise to infer climate dynamics, in my opinion the manuscript needs to be revised for improved clarity and readability. The quality of the figures needs to be substantially improved.

Authors: We have made substantive efforts to improve the clarity and readability of the manuscript. Particular effort has been directed at the figures incorporating much of the reviewers suggestions.

Reviewer #1 Title: IPO should be replaced by Interdecadal Pacific Oscillation

Authors: Done.

Reviewer #1 The structure of section 2 is very confusing, including both data description and results before the actual description of the methodology used to produce the results. It’s not clear why Figure 1a) is not a separate figure and instead is mixed with results in figures 1b)-d). Furthermore, Figure 1a) is poorly described, the legend includes text such as “mw (x5), lp, nh=7, which is not described in the caption (and it’s not clear whether really needed or it’s relevance). What is gained from such smoothed signals in a relatively short time series is not evident, and should be better described in the manuscript.

Authors: Figure 1 has now been split into 2 figures as recommended. New figure 1 (time-series) has been redrawn with pertinent time-series kept, labels indicating the observed phase of the IPO and annotations described in the caption. We have followed standard practice in low-pass/filtering the IPOTPI to highlight the lower frequency (decadal) variability, e.g., <https://psl.noaa.gov/data/timeseries/IPOTPI/>. Section 2 has been revised into subsections for improved readability.

Reviewer #1 The data description and it's presentation in table 1 needs to be improved in order to clarify how each climate index was indeed calculated and at what the temporal resolution. The minimalist caption in Table 1 should be improved. What does the * means in RMM1 and RMM2?

Authors: Additional text and links to the codes developed to calculate the climate indices have been included. All indices are based on monthly data except for the MJO RMM indices which are calculated using daily data and the indices averaged to monthly. The * superscript on RMM indices was used to indicate that due to the unavailability of daily ACCESS model data it was not possible to calculate the indices. The superscripts have been removed and explanatory text incorporated into the body of the manuscript.

Reviewer #1 Table 2 should be better described both in terms of the caption itself and in the text. The meaning of the "All years" column in Table 2 is not clear. More importantly, the objective criteria by which the positive and negative IPO phases are identified should be clearly and unambiguously stated.

Authors: We have added a more details in the revised caption to explain the contents of Table 2. "All years" has been changed to "Available years". As described in the text, we have used a simple moving-window applied to the monthly time-series, to identify phases of the IPO of sufficient length to enable fitting of the timeseries model. We have verified that using either a moving window or retained harmonics produces very similar estimations of prolonged periods where the system is in a given IPO phase. References to ERSST in the table and text has been retained as it is a highly reliable SST dataset and was used to confirm the reliability of the ERA5 dataset in estimating IPO variability.

Reviewer #1 The posterior probability plots should be improved (Figures 1b)-d), Figures 3, 4, and 5 by adding axes (as in Figure 1b), for consistency), and particularly to improve readability of the posterior probabilities, as in the current configuration it is not possible to effectively distinguish between low and intermediate probabilities. Maybe just providing the two highest probability ranges and distinguishing between them in another way other than width of the line (for example by using solid and dashed or dotted lines) would enable to reader to actually see the results, with the current design it's almost impossible.

Authors: We have added the x and y axis to all of the sub-figures as recommended. In addition we have modified the two highest probability ranges as solid lines to distinguish them from probabilities < 0.8 which are indicated by dashed lines. As any probability ≥ 0.5 is a reasonable indicative measure that a robust relationship exists between child and parent node, we retain these in the figures.