

Supplementary Materials for
A climate change signal in the tropical Pacific emerges from decadal variability

Feng Jiang *et al.*

*Feng Jiang. Email: fjiang@ldeo.columbia.edu

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Figs. S1 to S4

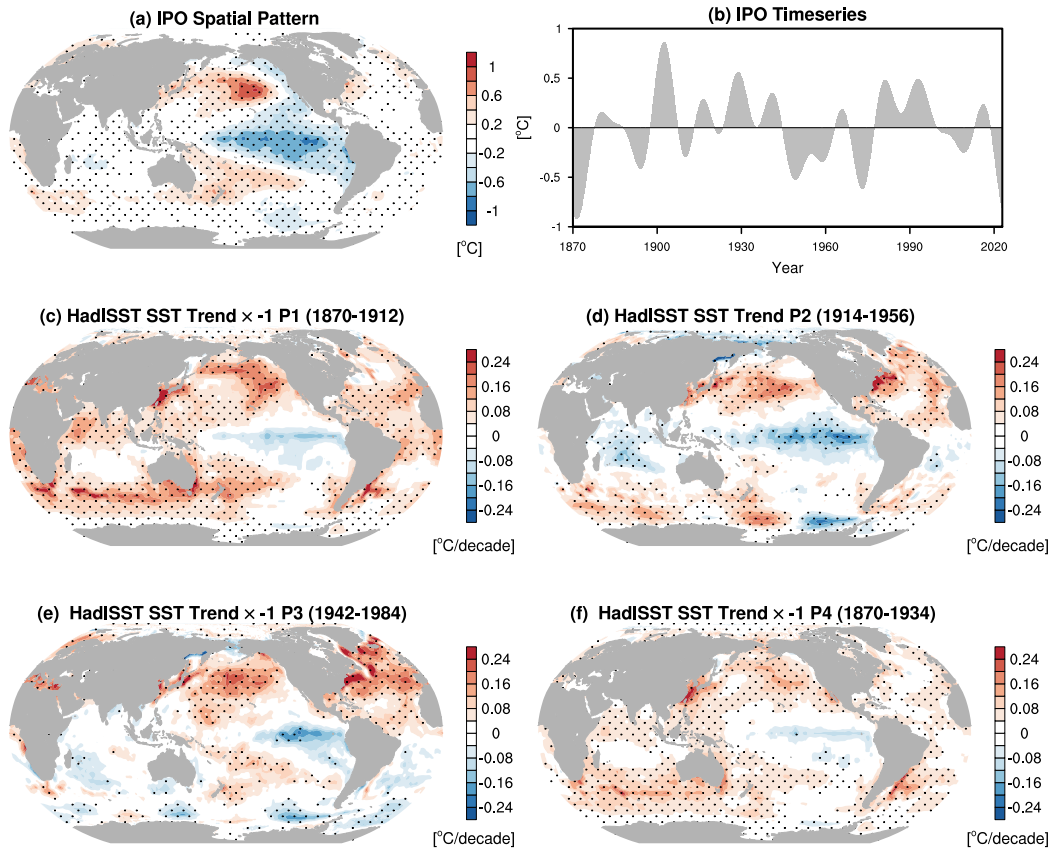


Fig. S1. (a) Spatial Pattern ($^{\circ}\text{C}$) and (b) timeseries ($^{\circ}\text{C}$) of the IPO based on HadISST. The IPO spatial pattern is obtained by regressing the detrended HadISST SST field onto the standardized IPO index. This spatial pattern is multiplied by a factor of -1 for comparison with Figure 1a. The SST trend ($^{\circ}\text{C}$ per decade) during (c) P1 (1870-1912), (d) P2 (1914-1956), (e) P3 (1942-1984) and (f) P4 (1870-1934). The trend patterns in P1, P3, and P4 are multiplied by a factor of -1 for illustration. Dots in (a, c-f) indicate the trend exceeding the 95% confidence level.

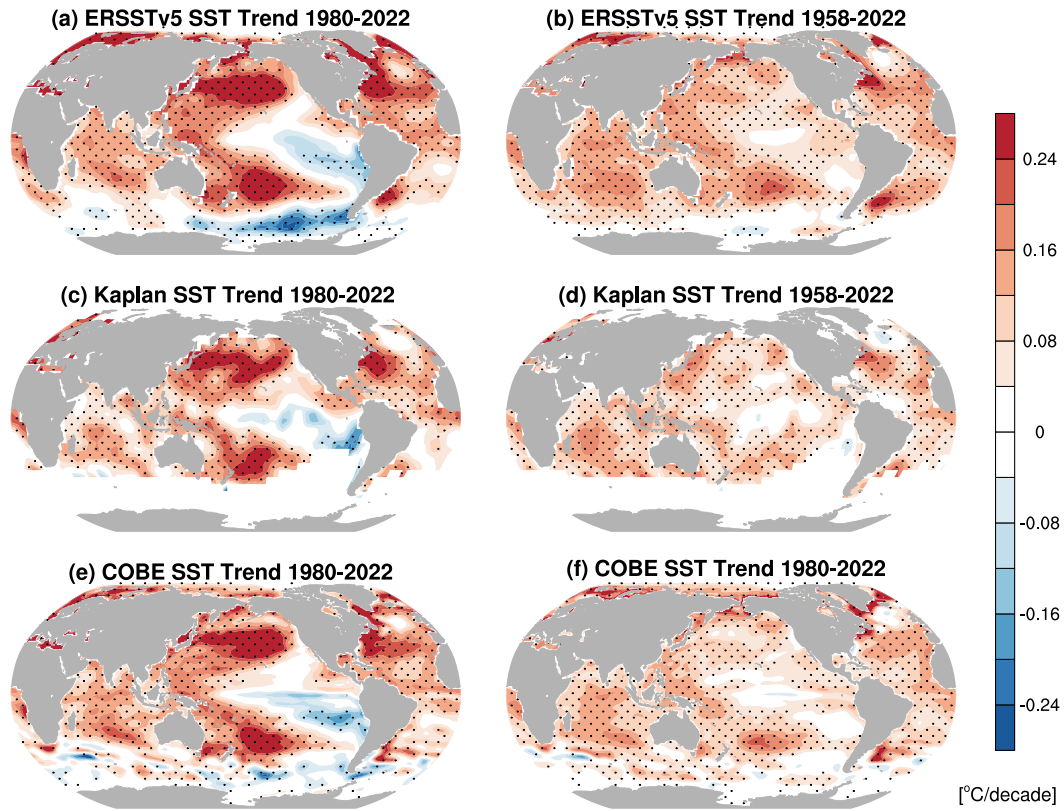


Fig. S2. The SST trend ($^{\circ}\text{C}$ per decade) based on ERSSTv5 during (a) 1980-2022 and (b) 1958-2022. The SST trend ($^{\circ}\text{C}$ per decade) based on Kaplan during (c) 1980-2022 and (d) 1958-2022. The SST trend ($^{\circ}\text{C}$ per decade) based on COBE during (e) 1980-2022 and (f) 1958-2022. (g) Pattern correlations of 43-year SST trend in the tropical Pacific (30°S - 30°N , 120°E - 270°W , indicated by red solid line) with the trend during 1980-2022 based on ERSSTv5 (grey line), Kaplan (red line), COBE (blue line). (d) Similar to (c) but for 65-year SST trend with the trend during 1958-2022. Dots in (a-f) indicate the trend exceeding the 95% confidence level.

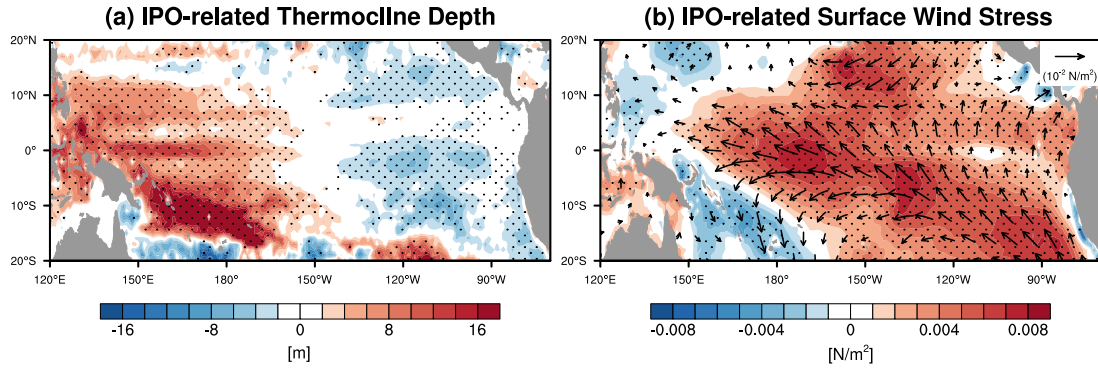


Fig. S3. (a) The regression of the ORAs5 thermocline depth (m) upon the standardized IPO index during 1958-2022. (b) The regression of the ORAs5 surface wind stress (vector; N/m^2) and SSH (m) upon the standardized IPO index during 1958-2022.

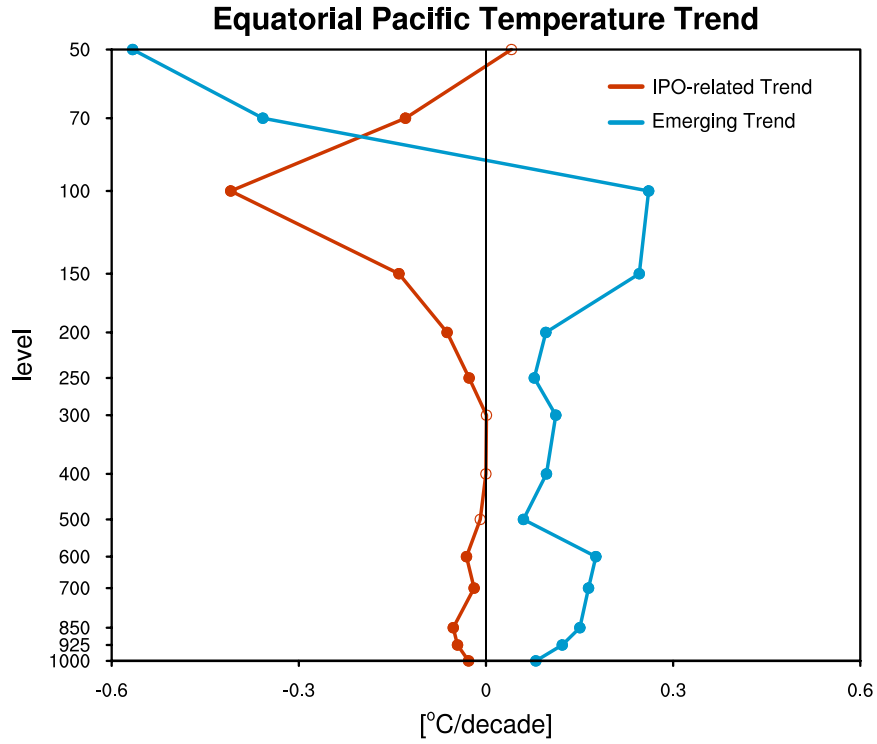


Fig. S4. Trend in air temperature averaged over the equatorial Pacific (5°S–5°N, 120°W–270°W) related to the IPO and the emerging climate change (°C per decade; see Statistical methods and definitions of indices in Materials and Methods for explanations of the IPO-related trend) during 1958-2022. The solid dots indicate values exceeding 95% significance tests.