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The Interdecadal Change of the Relationship Between North Indian Ocean SST and Tropical North Atlantic SST

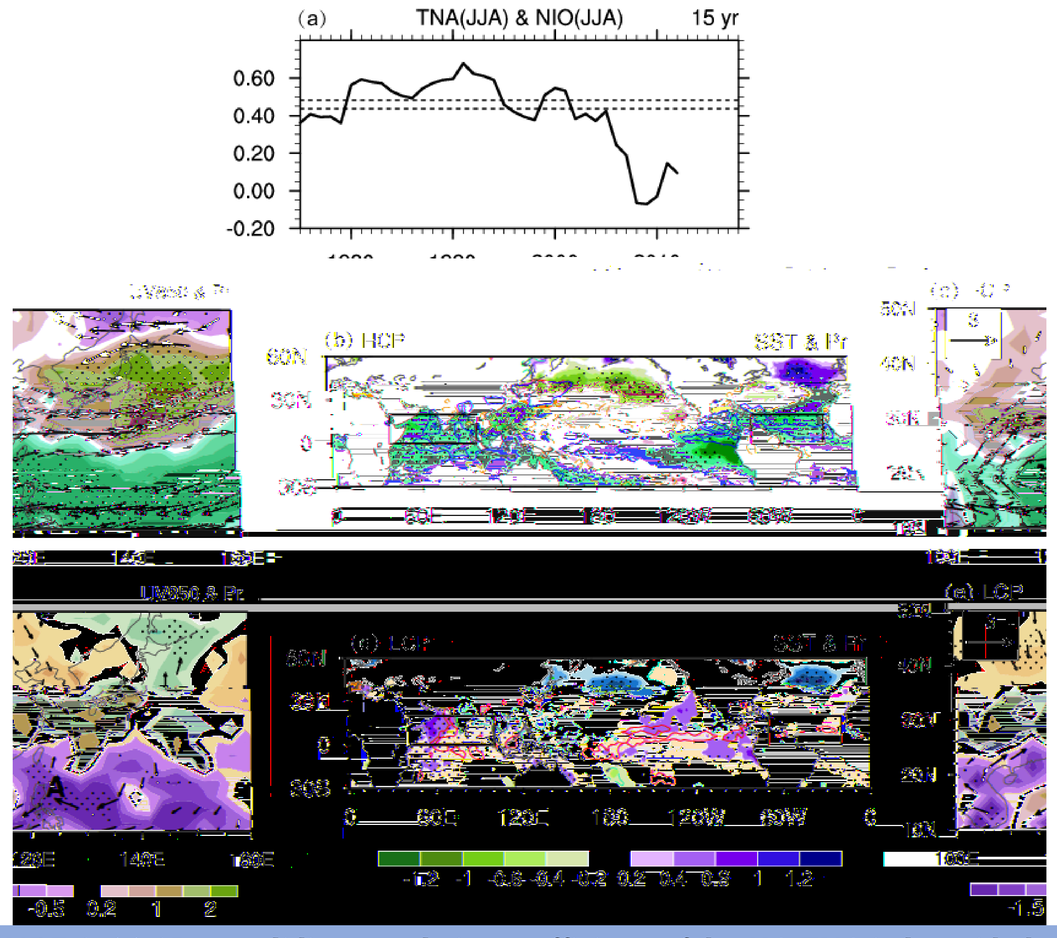

FIGURE 1. (a) 15-year sliding correlation coefficients of the JJA TNA index with the NIO index. The dashed lines indicate the 90% and 95% confidence levels, respectively. Composite differences of JJA SST anomalies (°C), precipitation anomalies (shading; mm/day) and 850-hPa wind anomalies (vectors; m s) between positive and negative cases during (b, c) High Correlation Period (HCP) and (d, e) Low Correlation Period (LCP) during 1980 2020. The green (purple) contour lines in (b, d) represent the positive (negative) precipitation anomalies, respectively. The contour interval is 2 mm/ day. The dots indicate the composite differences are above the 95% confidence levels. The boxes shown are the NIO (0° 20°N, 40° °E) and TNA (0° 20°N, 70°W 20°W) regions, respectively. Winds anomalies exceeding the 95% confidence level are shown. The letters □ □ □ □

The summertime North Indian Ocean (NIO) and tropical North Atlantic (TNA) sea surface temperature (SST) anomalies exert important impacts on the East Asian summer monsoon (EASM). The NIO–TNA SST relationship experiences an obvious interdecadal change around the early 2000s. The NIO and TNA SST correlation is positive and significant before the early 2000s, while this connection becomes weak and insignificant after that. This interdecadal change is closely associated with the changes in the El Niño-Southern Oscillation (ENSO) intensity.

Recent interdecadal changes in the Tropospheric Biennial Oscillation of the East Asian summer monsoon

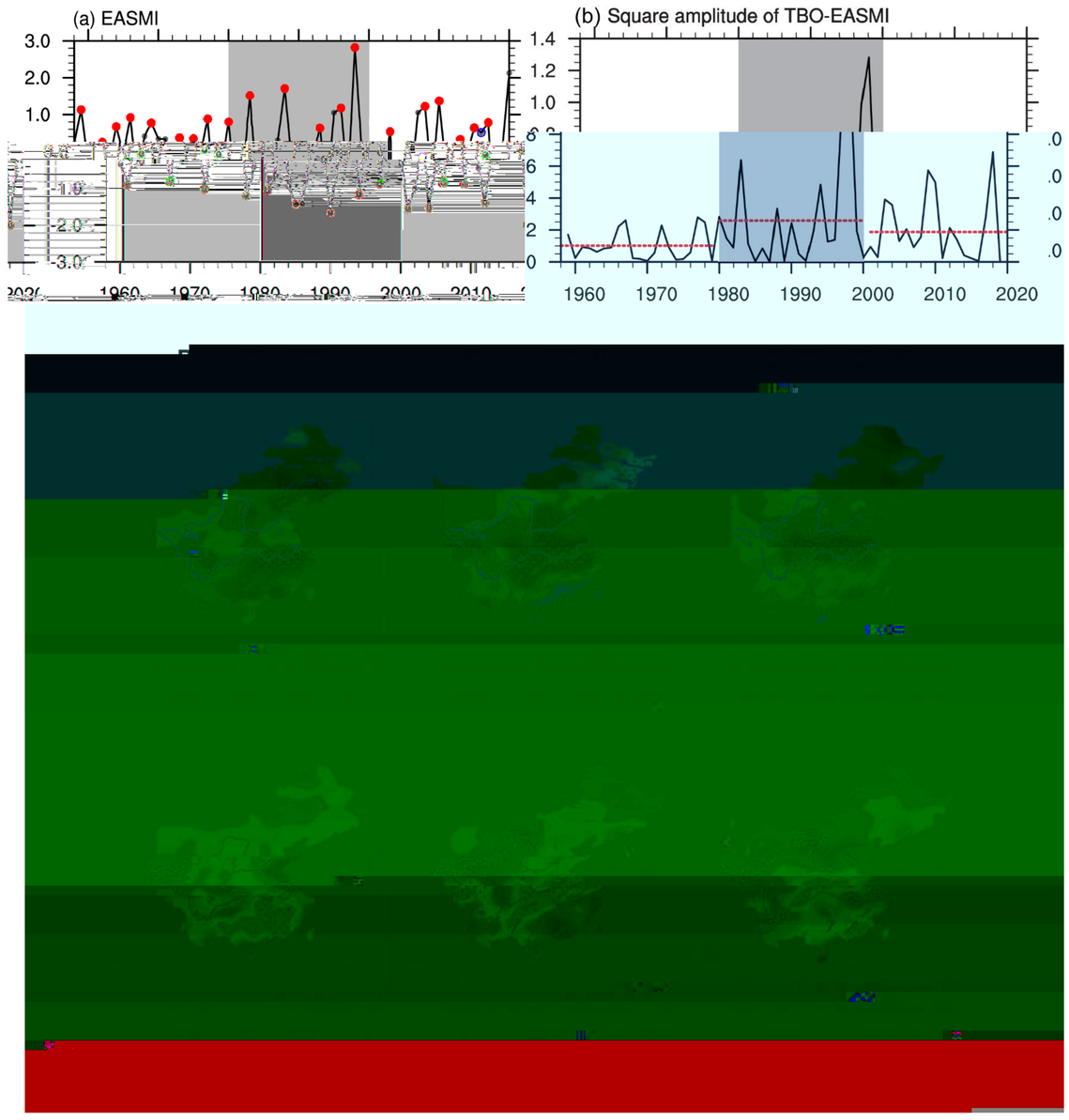

FIGURE 2. (a) Time series of the summer (JJA) mean EASM index in the period 1958 2020. Solid dots indicate strong (red) and weak (blue) TBO years when the EASM is stronger or weaker than the preceding and following years, respectively. (b) Square amplitude of the TBO bandpass-filtered EASM index. The red lines indicate the amplitude averaged during P1 (1958 1979), P2 (1980 2000) and P3 (2001 2020). (c-h) Differences in 850- □ □ □ □ □ □ □ □ □ □ □ stations over China (contours; mm/month) between the composites of the weak and strong TBO cases in JJA(0) and JJA (1) during (c, f) P1, (d, g) P2 and (e, h) P3, respectively. Dots indicate composite differences significant at the 95% confidence level. Wind □ □ □ □ □ □ □ □ □ □ □ □ □ indicate the anticyclonic and cyclonic anomalies, respectively.

This paper focuses on the interdecadal changes in the biennial EASM transition related to the Tropospheric Biennial Oscillation (TBO), which has major impacts on East Asian climate. During 1958 2020, the TBO signal in the EASM exhibits noticeable interdecadal changes around the late