SUPPLEMENT

EFFECTS OF ANTHROPOGENIC FORCING AND NATURAL VARIABILITY ON THE 2018 HEATWAVE IN NORTHEAST ASIA

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INFLATION CALIBRATION METHOD. The inflation calibration we used is the method proposed by Johnson and Bowler (2009). This calibration method aims to adjust the simulated ensemble variance to represent the uncertainty in the ensemble mean as well as observed climatological variance while retaining the correlation of the adjusted ensemble mean with the observation.

Here, we apply the inflation calibration to the seasonal mean (July–August) T_{max} simulated by AllForc during 1980–2018 at each grid point along with the ensemble mean of three reanalysis datasets as references. The obtained calibration coefficients were applied to the whole period (1941–2050) of the simulated T_{max} by AllForc and 1941Forc to calibrate the T_{max}.

REFERENCES

Johnson, C., and N. Bowler, 2009: On the reliability and calibration of ensemble forecasts. *Mon. Wea. Rev.*, **137**, 1717–1720, https://doi.org/10.1175/2009MWR2715.1.
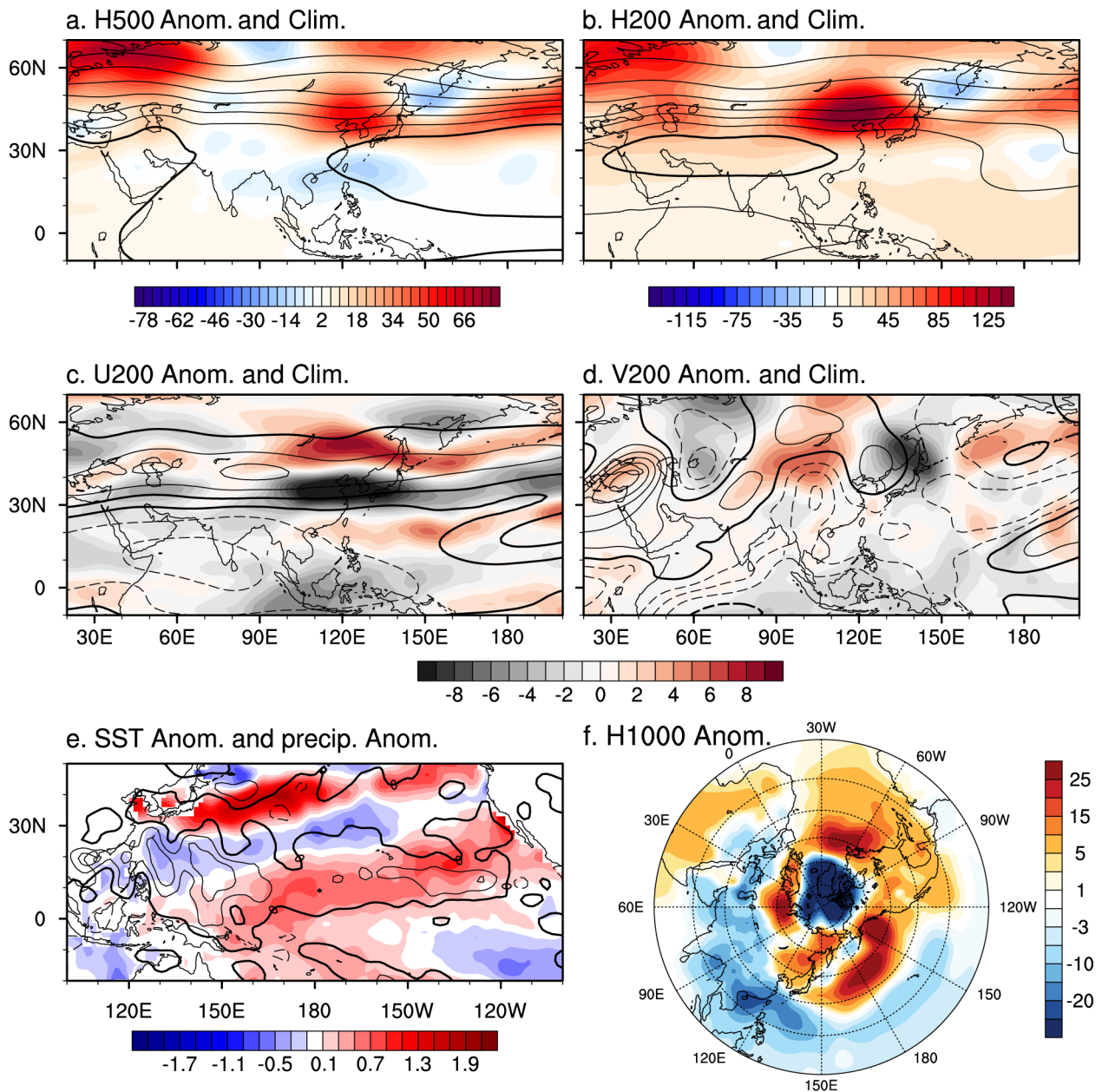
FIG. ES1. Observed 2018 geopotential height anomaly (shading; units: gpm) and climatological mean (contour; units: gpm) at (a) 500 and (b) 200 hPa. (c) Zonal and (d) meridional wind anomaly (shading; units: m s^{-1}) and climatology (contour; units: m s^{-1}), (e) SSTA (shading; units: K) and precipitation anomaly (contour; units: mm day^{-1}), and (f) geopotential height anomaly at 1,000 hPa (shading; units: gpm) during July–August. All anomalies are relative to the 1980–2018 climatology. Thick solid contours are 5,880 gpm in (a) and 12,500 gpm in (b).
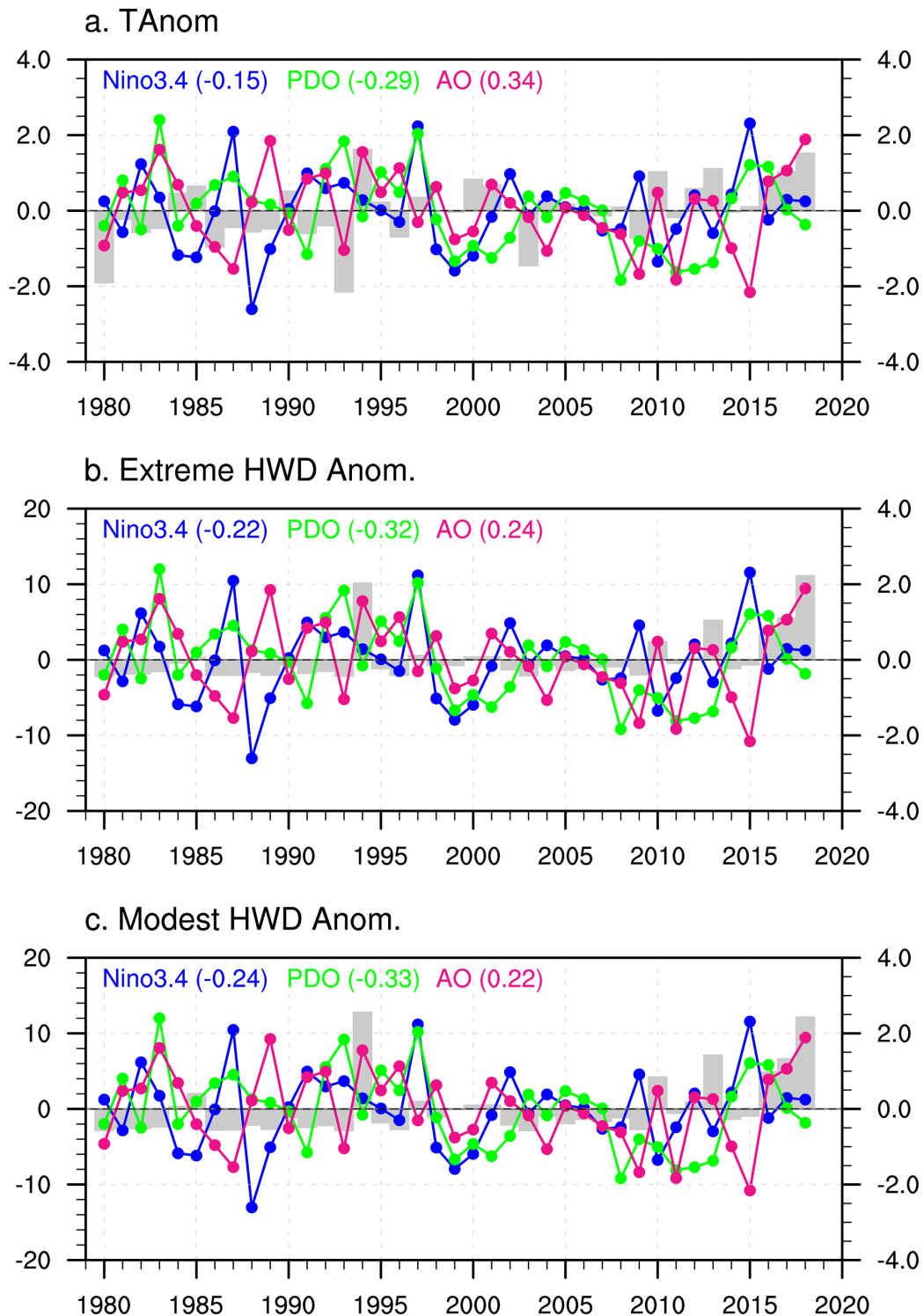
Fɪɢ. ES2. Gray bars (right *y* axis) indicate observed interannual variability of HW-related variable anomalies for: (a) TAnom (K), (b) extreme HWDs, and (c) modest HWDs. Values are derived from the average of three reanalysis datasets. Colored lines (left *y* axis) denote three observed natural variability indices: Niño-3.4 (blue lines), PDO (green lines), and AO (pink lines). The correlation coefficients between each natural variability index and given HW-related variable anomaly are shown as numbers in parentheses in each panel.