Supplementary Information

Slow-down in summer warming over Greenland in the past decade linked to central Pacific El Niño

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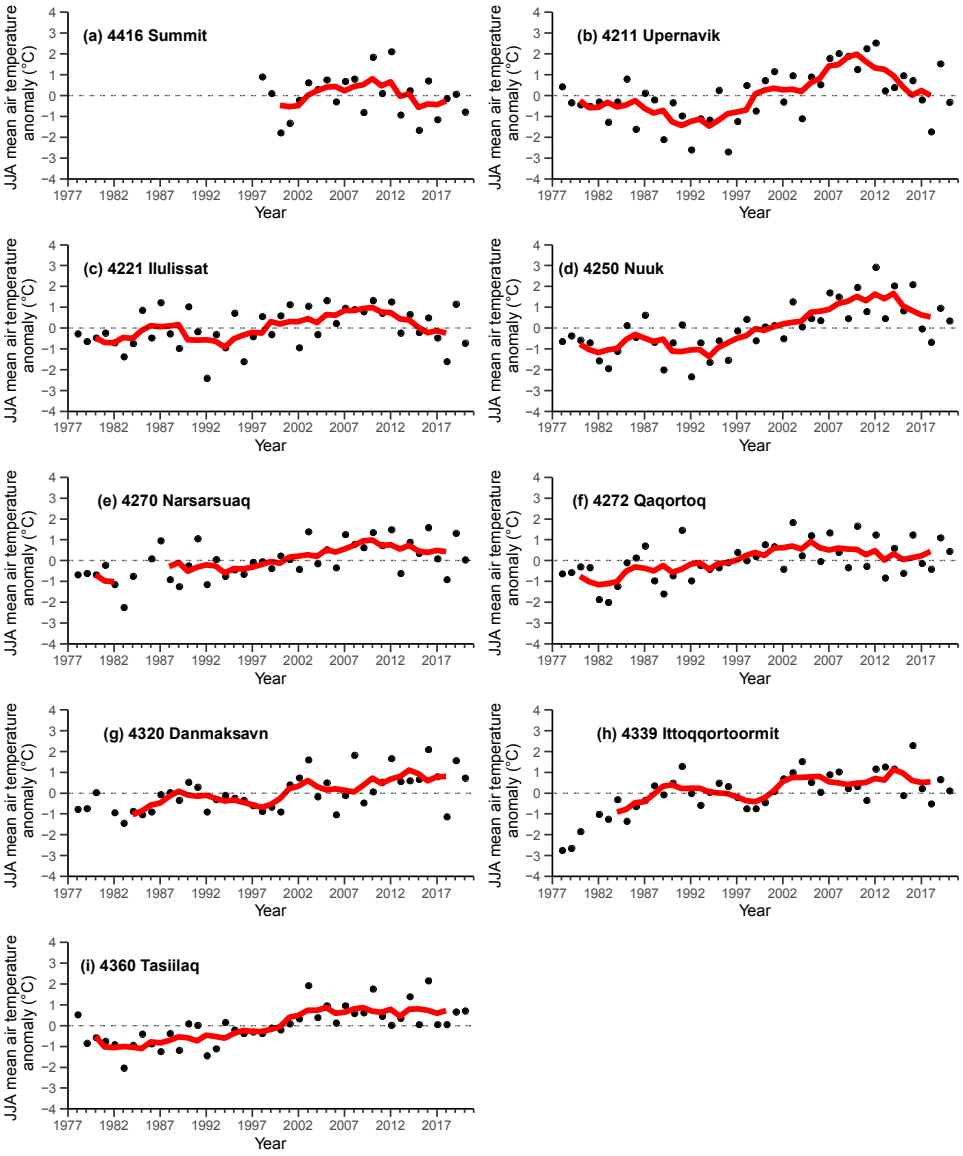
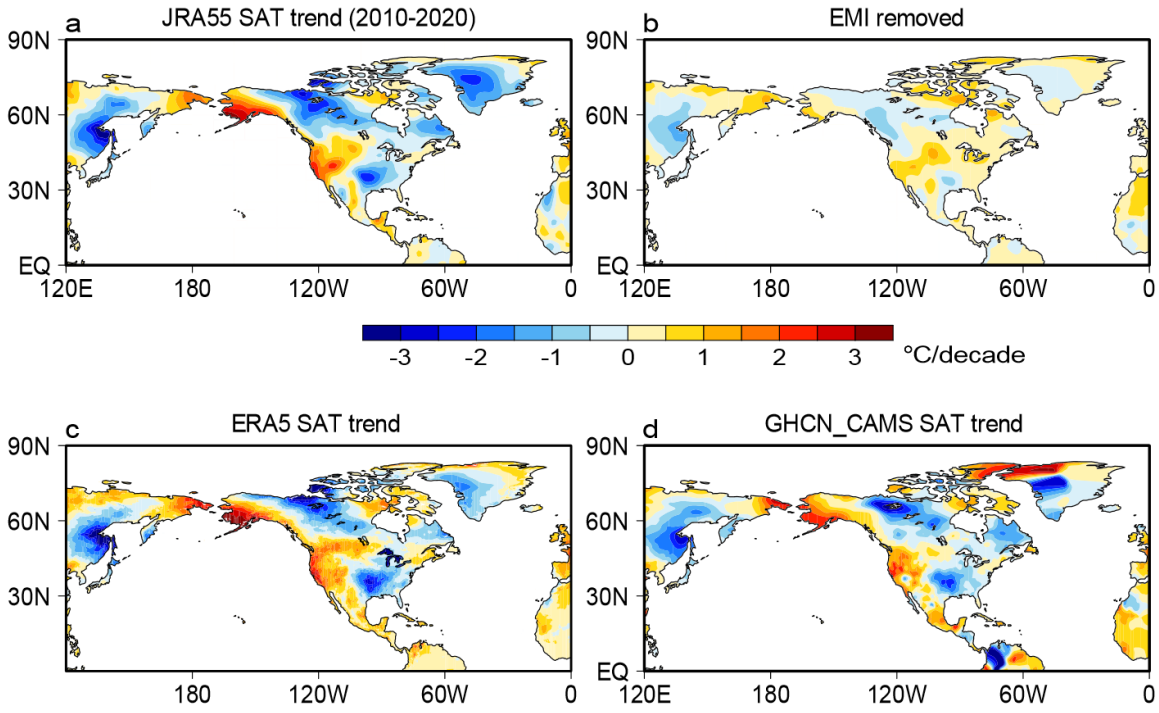
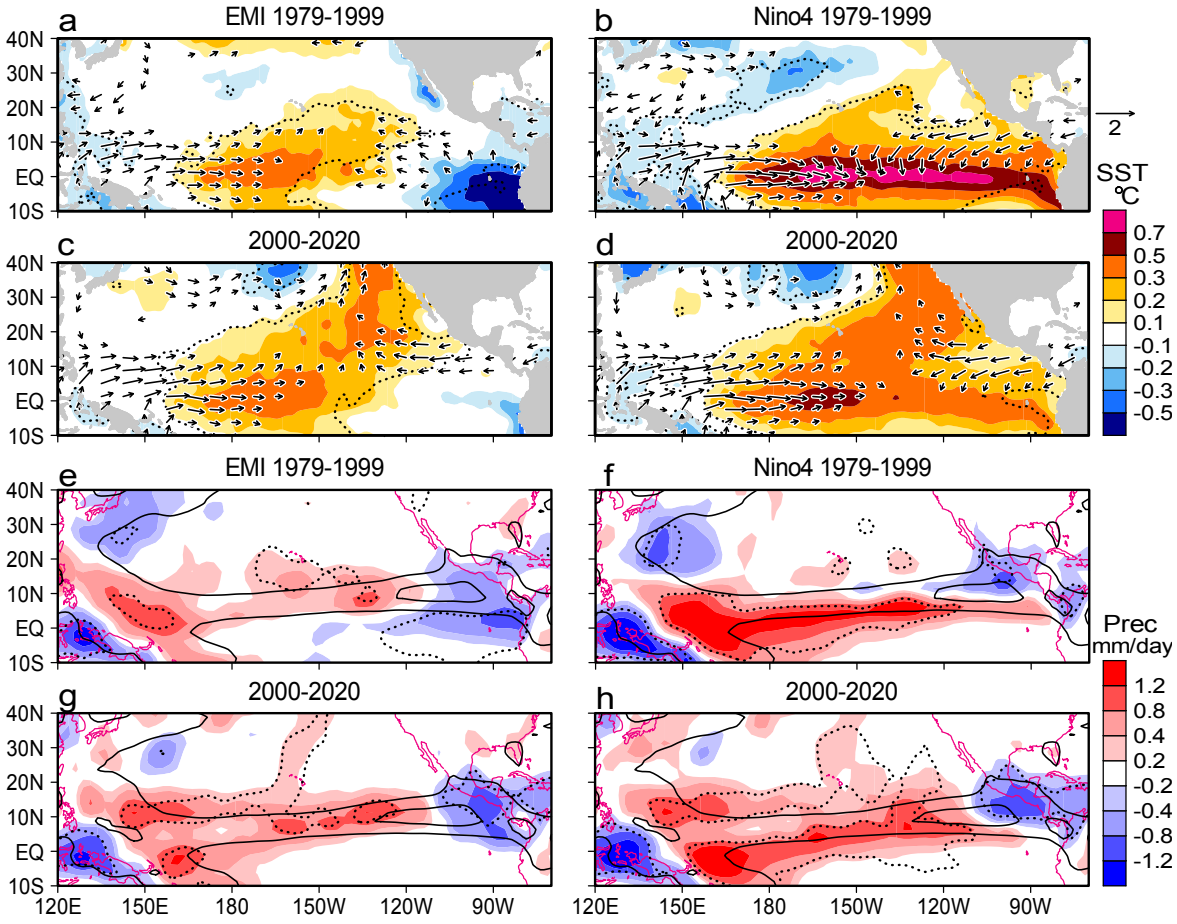


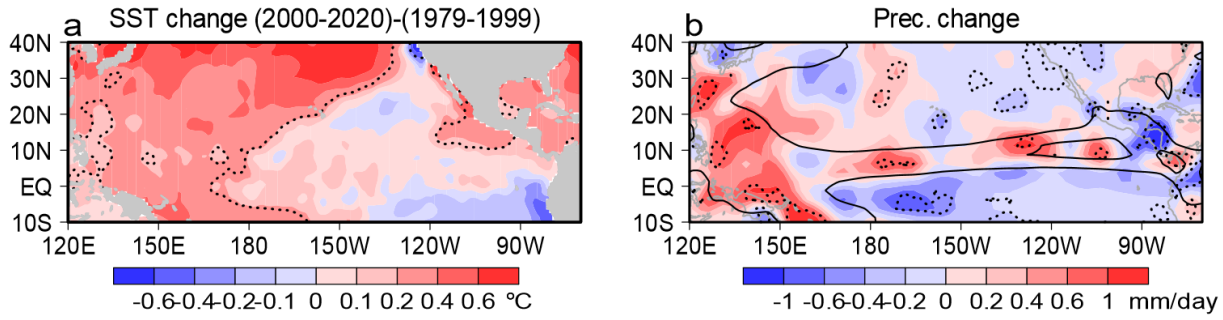
Supplementary Figure 1. Summer (JJA) surface air temperature anomaly with a 5-year running mean (red line) for selected Greenland stations at (**a**) Summit, (**b**) Upernavik, (**c**) Ilulissat, (**d**) Nuuk, (**e**) Narsarsuaq, (**f**) Qaqortoq, (**g**) Danmarkshavn, (**h**) Ittoqqortoormiit, and (**i**) Tasiilaq, relative to 1978–2020 average. Summit in 2019 and 2020 is based on NOAA Geosummit data and the anomaly is relative to 1998–2020 average. Station (**a**) is set in the centre of Greenland, stations (**b**)–(**f**) are in the west coast, and stations (**g**)–(**i**) are in the east coast. The 5-digit numbers refer to the World Meteorological Organization station codes.



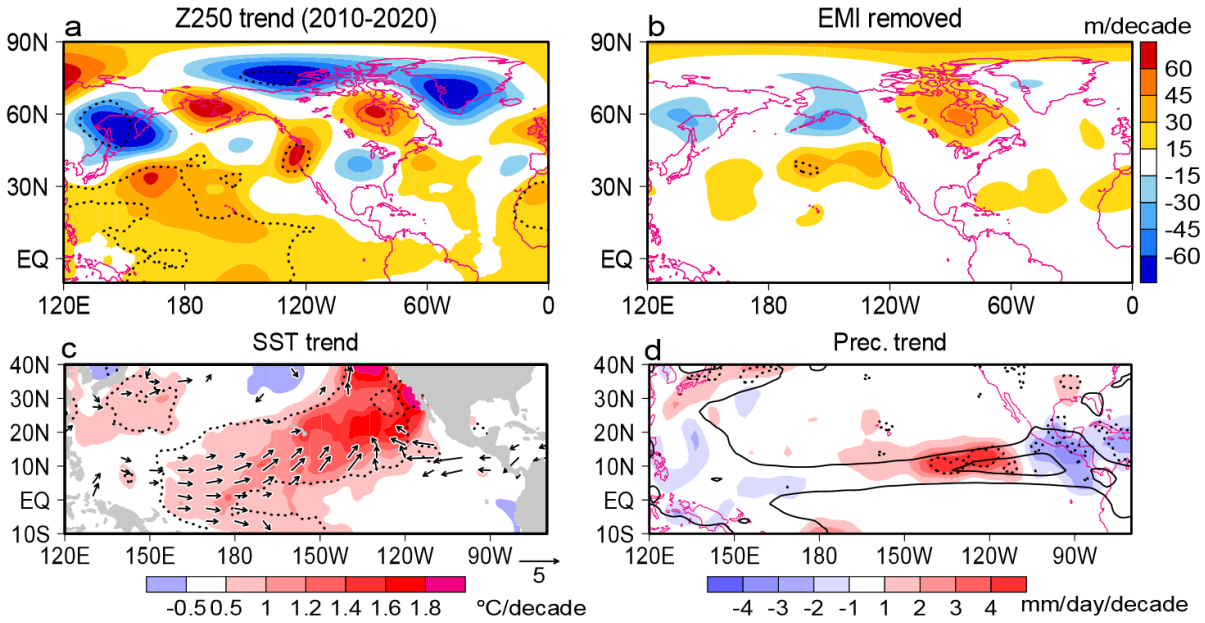
Supplementary Figure 2. Linear trend of SAT for 2010–2020 in (**a**) JRA55, (**c**) ERA5, and (**d**) GHCN CAMS. (**b**) As in (**a**), but for after removing the EMI-related component.



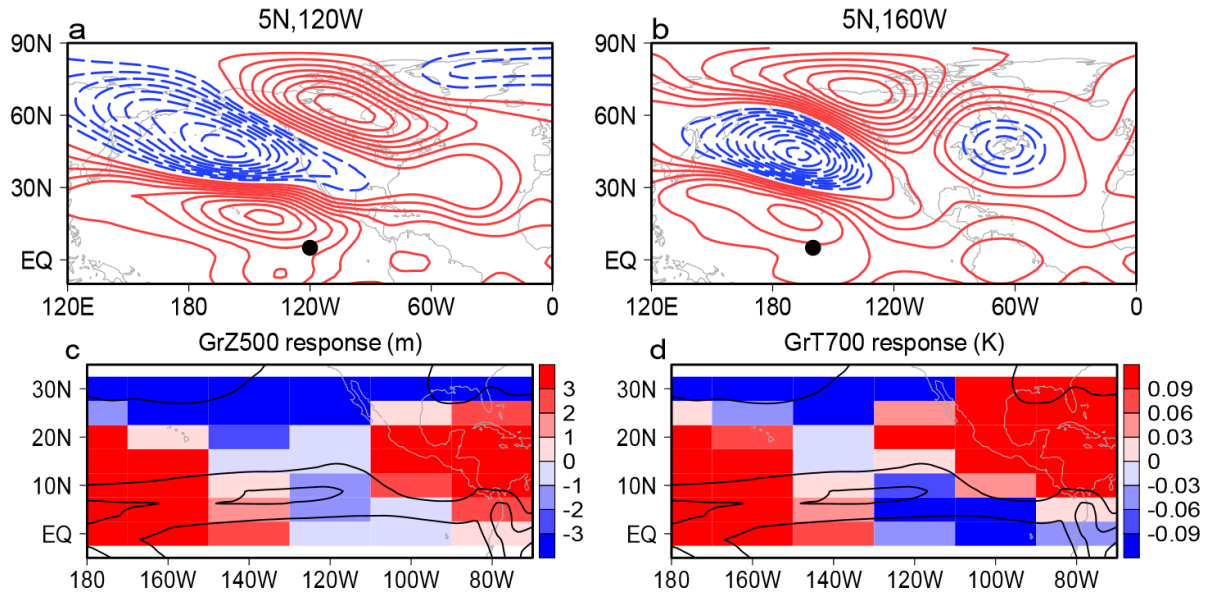
Supplementary Figure 3. Regressed anomalies of detrended SST (shaded) and 10-m wind (vectors; m s^{-1}) onto (**a**) EMI and (**b**) Niño4 SST for 1979–1999. Dotted contours indicate the 95% significant level. (**c**), (**d**) As in (**a**) and (**b**), but for 2000–2020. (**e**), (**f**) As in (**a**) and (**b**), but for precipitation anomalies. Black contours indicate mean precipitation (contour interval is 5 mm day^{-1}). (**g**), (**h**) As in (**e**) and (**f**), but for 2000–2020.



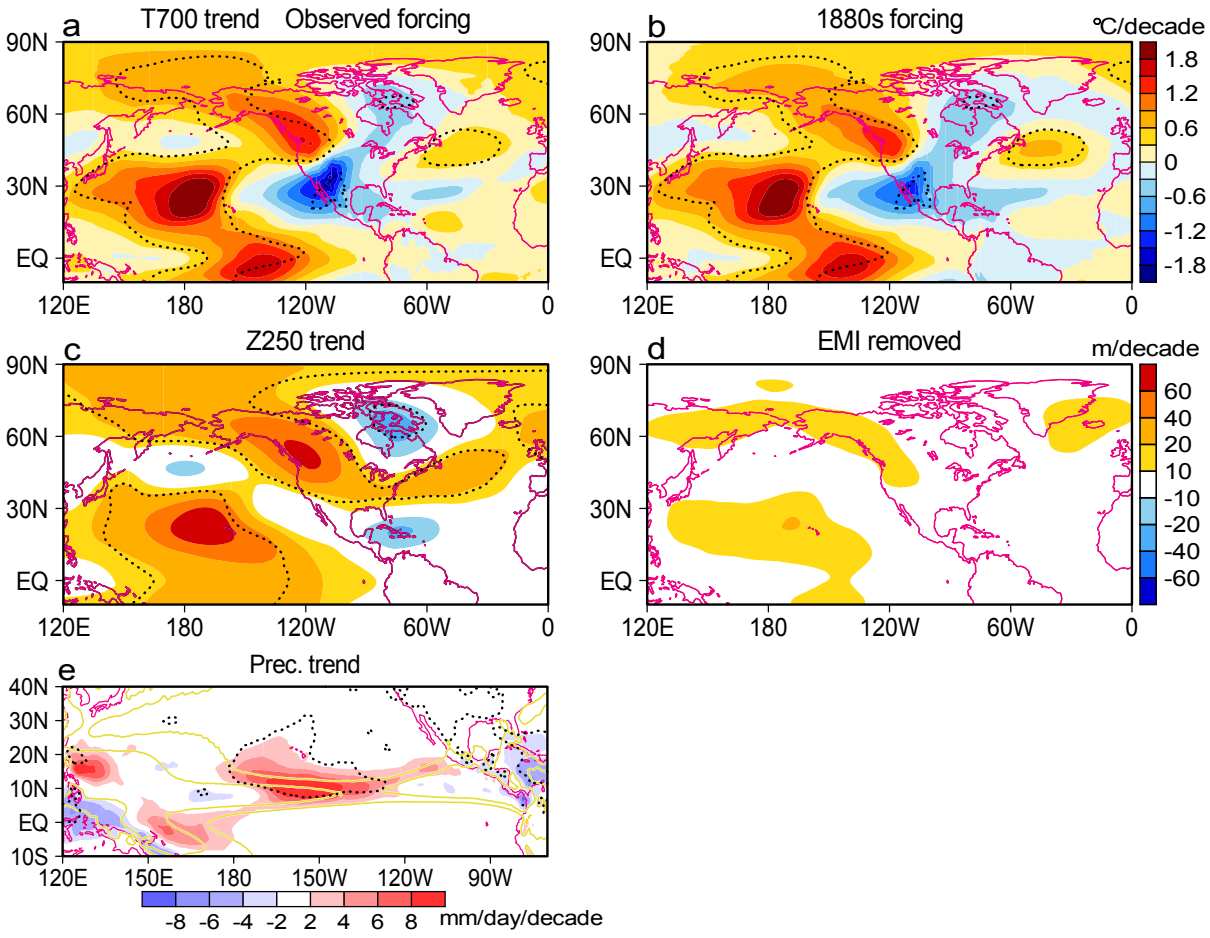
Supplementary Figure 4. (**a**) SST and (**b**) precipitation differences between the averaged periods 2000–2020 and 1979–1999. Dotted contours indicate the 95% significant level, and thick black contours in **b** indicate mean precipitation (contour interval is 5 mm day^{-1}).



Supplementary Figure 5. Linear trend of (**a**) 250-hPa geopotential height, (**c**) SST and 10-m wind (vectors), and (**d**) precipitation for 2010–2020. (**b**) As in (**a**), but for after removing the EMI-related component. Dotted contours indicate the 95% significant level, and thick black contours in **d** indicate mean precipitation (contour interval is 5 mm day^{-1}).



Supplementary Figure 6. Response of wintertime (DJF) 250-hPa geopotential height to idealized heating centred at (a) 5°N, 120°W and (b) 5°N, 160°W (black circles, respectively) in the LBM experiments (Contour interval is 2 m with the zero contour omitted; red for positive, blue for negative). Spatial distribution of responses of (c) 500-hPa geopotential height and (d) 700-hPa temperature over Greenland (60°–85°N, 20°–60°W) to a single heating whose centre is located at each grid. Response is plotted at the centre of the heating location. Black contours indicate observed mean precipitation for 1979–2020 (contour interval is 3 mm day^{-1}).



Supplementary Figure 7. Linear trend of JJA 700-hPa temperature for 2010–2019 in ECHAM5 model forced with (**a**) observed forcing and (**b**) 1880s forcing. As in (**a**), but for (**c**) 250-hPa geopotential height and (**e**) precipitation. (**d**) As in (**c**), but for after removing the EMI-related component. Dotted contours indicate the 95% significant level and thick contours in **e** indicate mean precipitation (contour interval is 5 mm day^{-1}).