Supplementary Materials for Interdecadal shift in the impact of winter land-sea thermal contrasts on following spring transcontinental dust transport pathways in North Africa

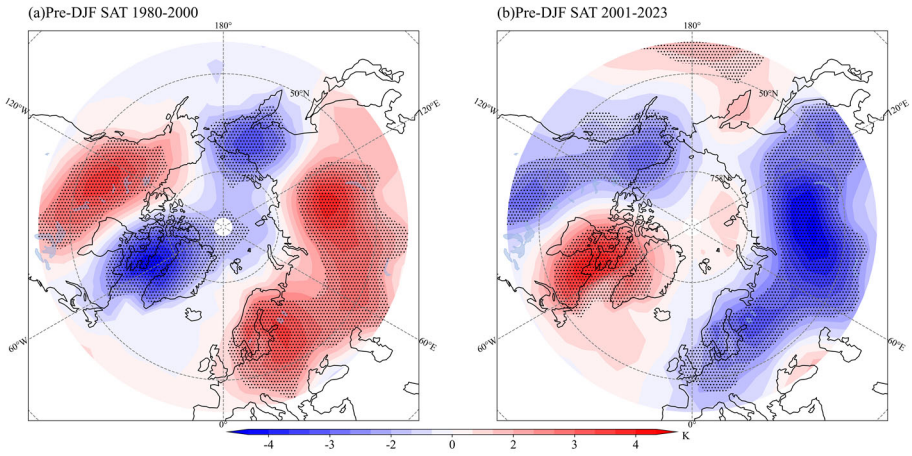

Fig. S1: Extratropical SAT anomalies in the pre-winter of composite analysis during the two periods. SAT anomalies in (a) 1980–2000 with positive LSC minus negative LSC and in (b) 2001–2023 with negative LSC minus positive (shading; K). The dashed dots indicate that the anomalies pass the 90% confidence test.

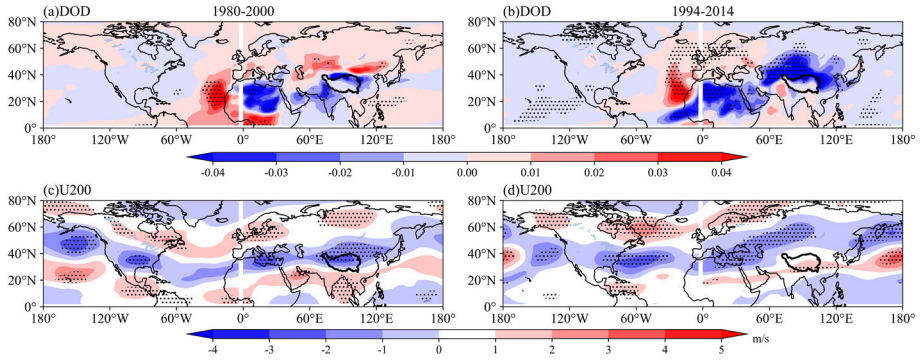

Fig. S2. Regression patterns of Dust Aerosol Optical Depth (DOD) and U200 onto LSC in

CMIP6 during 1980–2000 and 1994–2014. Regression coefficients of (a) DOD and (c) U200 onto standardized LSC in CMIP6 ensemble (including CESM2, IPSL-CM6A-LR-INCA, IPSL-CM6A-LR, CanESM5-1, and MRI-ESM2-0) during 1980−2000. (c) DOD and (d)U200 in CMIP6 ensemble (including CESM2, IPSL-CM5A2-INCA, IPSL-CM6A-LR-INCA, IPSL-CM6A-LR, CanESM5, and MRI-ESM2-0) during 1994−2014. The dashed dots indicate that the anomalies pass the 90% confidence test.

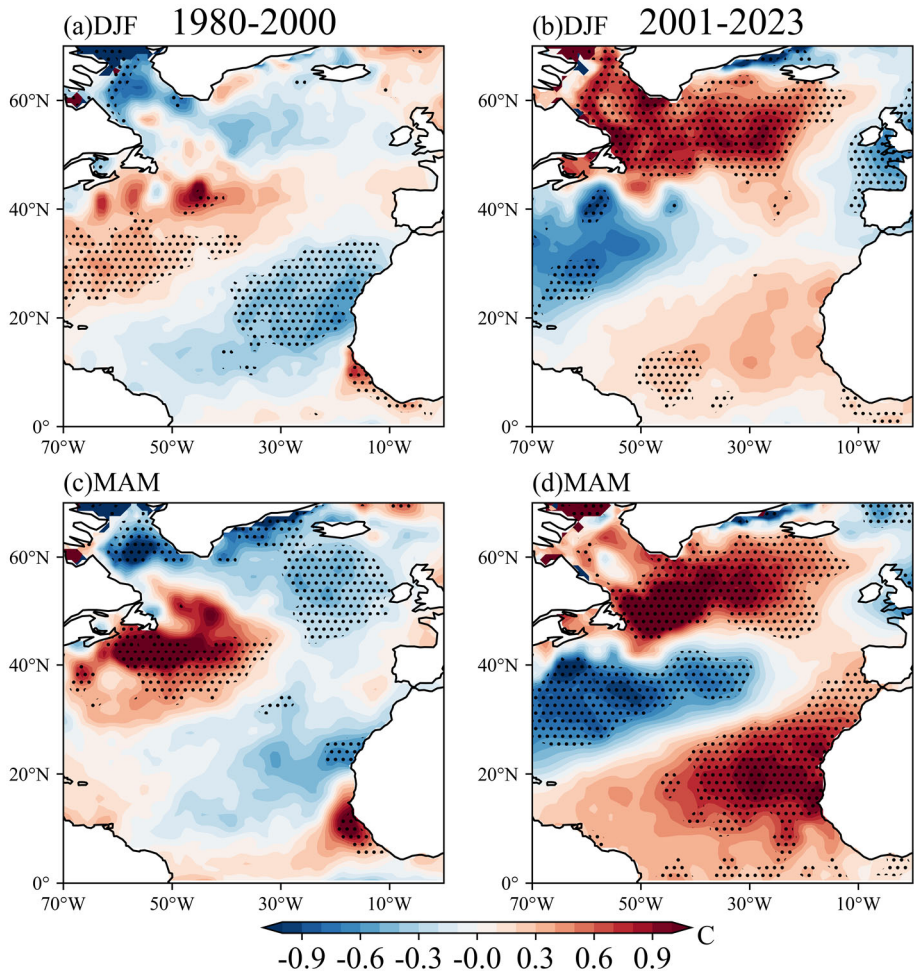

Fig. S3: SSTA anomalies from pre-winter to spring associated with pre-winter LSC of composite analysis during the two periods. Composite SSTA in (a) DJF and (c) MAM during 1980−2000 with positive LSC minus negative LSC. (b) DJF and (d) MAM are for 2001−2023 with negative LSC minus positive LSC.

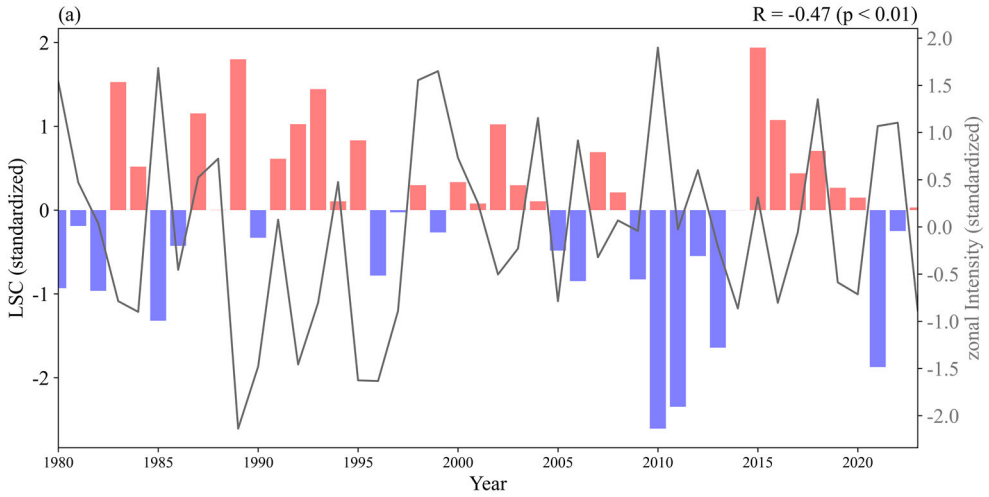

Fig. S4: Time series of standardized LSCI (bar) and standardized zonal circulation intensity index (solid line). The correlation between the two variables is −0.47 and passes 99% significance tests. The zonal circulation intensity index is defined as the ratio of the difference in Z500 between 30°N and 60°N to the difference between these two latitudes (averaged between 0° and 100°W).

Table S1 List of CMIP6 models analyzed in this study.

Model
CESM2[1]
IPSL-CM5A2-INCA[2]
IPSL-CM6A-LR-INCA[3]
IPSL-CM6A-LR[4]
CanESM5-1[5]
CanESM5[6]
MRI-ESM2-0[7]

Reference:

[1] Danabasoglu G (2019) NCAR CESM2 model output prepared for CMIP6 CMIP historical. Earth System Grid Federation

[2] Boucher O, Denvil S, Levavasseur G, et al. (2020) IPSL IPSL-CM5A2-INCA model output prepared for CMIP6 CMIP historical. Earth System Grid Federation

[3] Boucher O, Denvil S, Levavasseur G, et al. (2021) CMIP6 CMIP IPSL IPSL-CM6A-LR-INCA historical. Earth System Grid Federation

[4] Boucher O, Denvil S, Levavasseur G et al (2018) IPSL IPSL-CM6A-LR model output prepared for CMIP6 CMIP historical. Earth System Grid Federation

[5] Swart NC, Cole JNS, Kharin VV et al (2019) CCCma CanESM5-1 model output prepared for CMIP6 CMIP historical. Earth System Grid Federation

[6] Swart NC, Cole JNS, Kharin VV et al (2019) CCCma CanESM5 model output prepared for CMIP6 CMIP historical. Earth System Grid Federation

[7] Yukimoto S, Koshiro T, Kawai H, et al. (2019) MRI MRI-ESM2.0 model output prepared for CMIP6 CMIP historical. Earth System Grid Federation