Supplementary Information

Atlantic Ocean Influence on Middle East Summer Surface Air Temperature

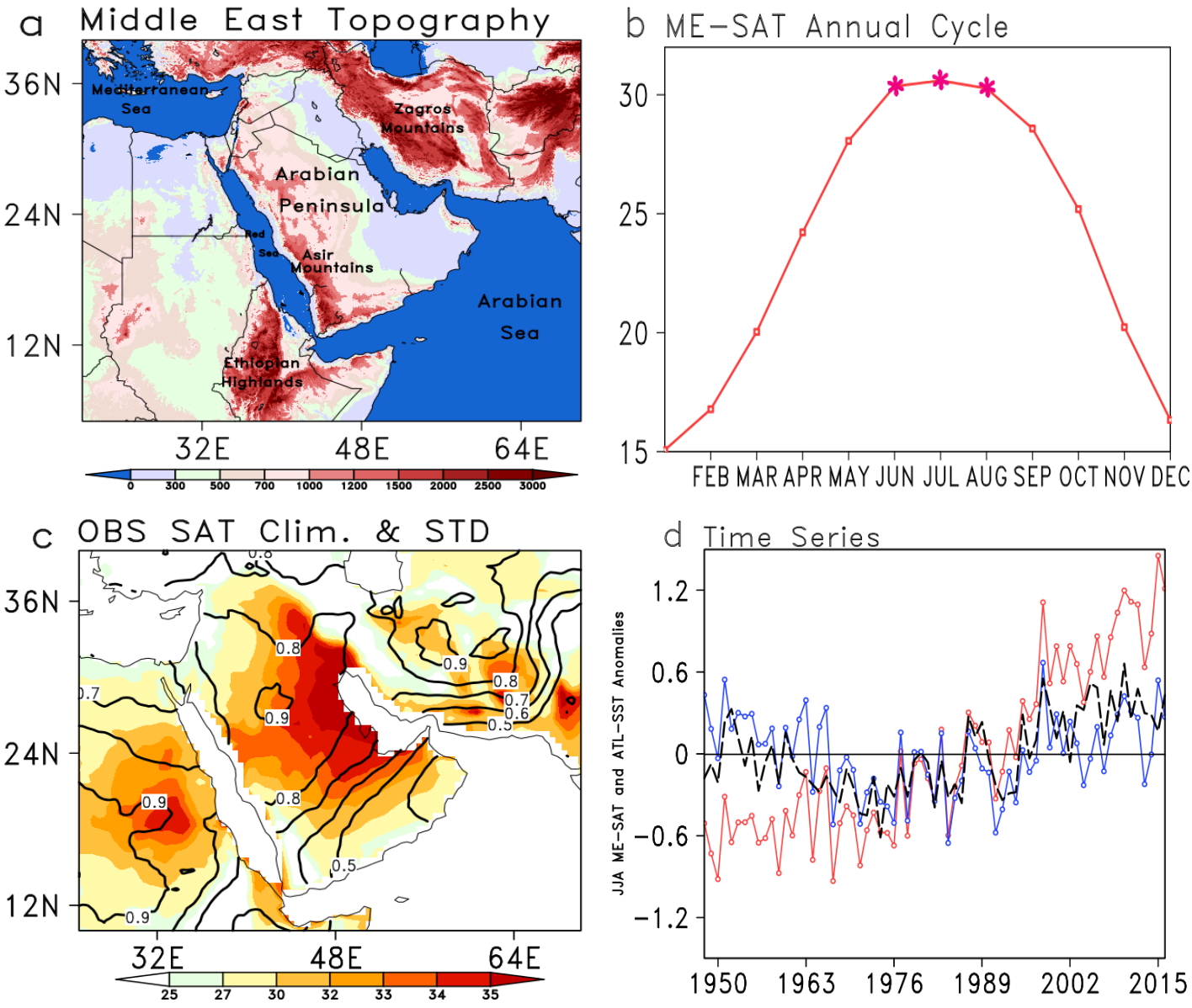
Contents of this File

Introduction

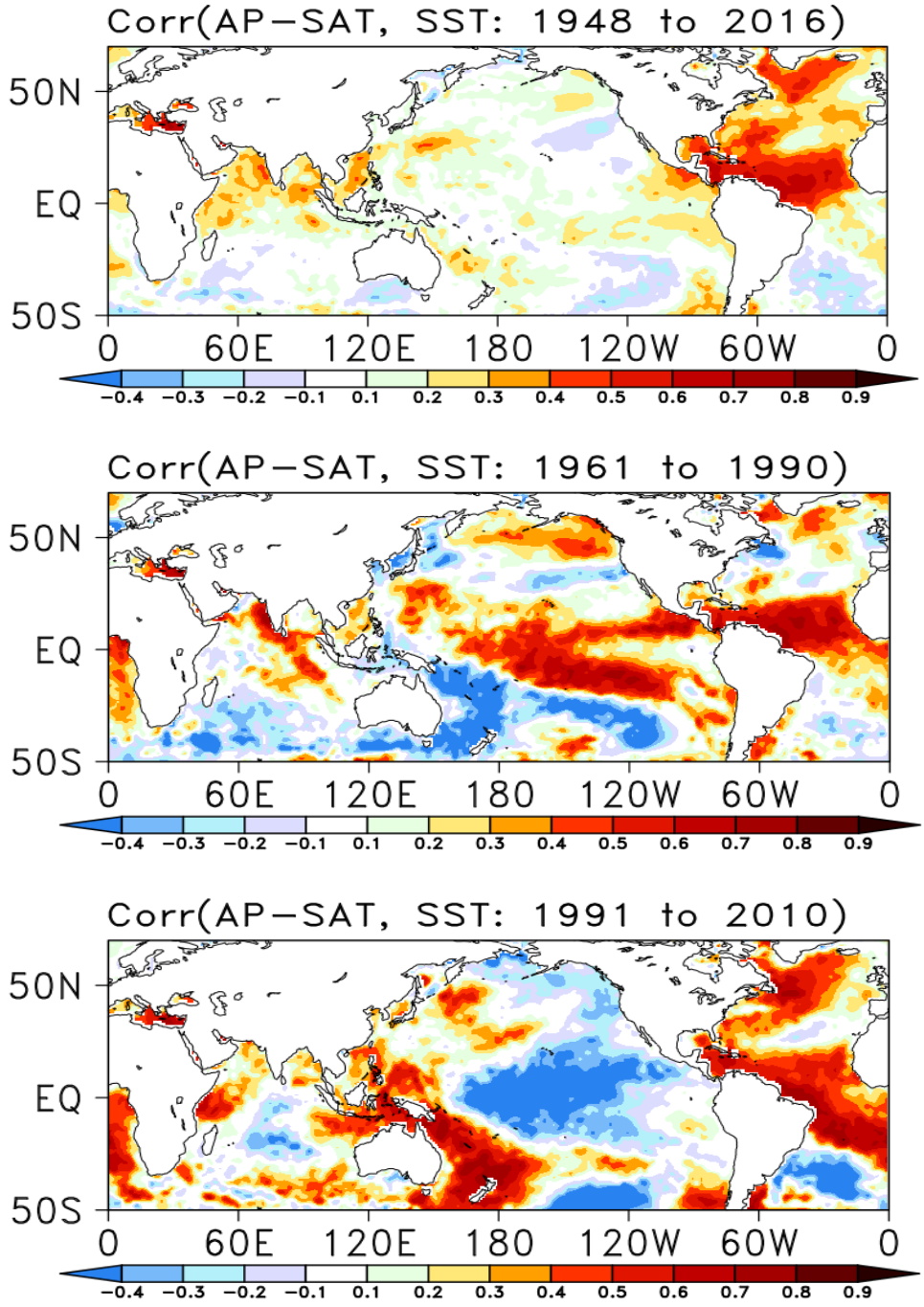
This Supplementary Information is discussed and referred in the main article.

Supplementary Text:

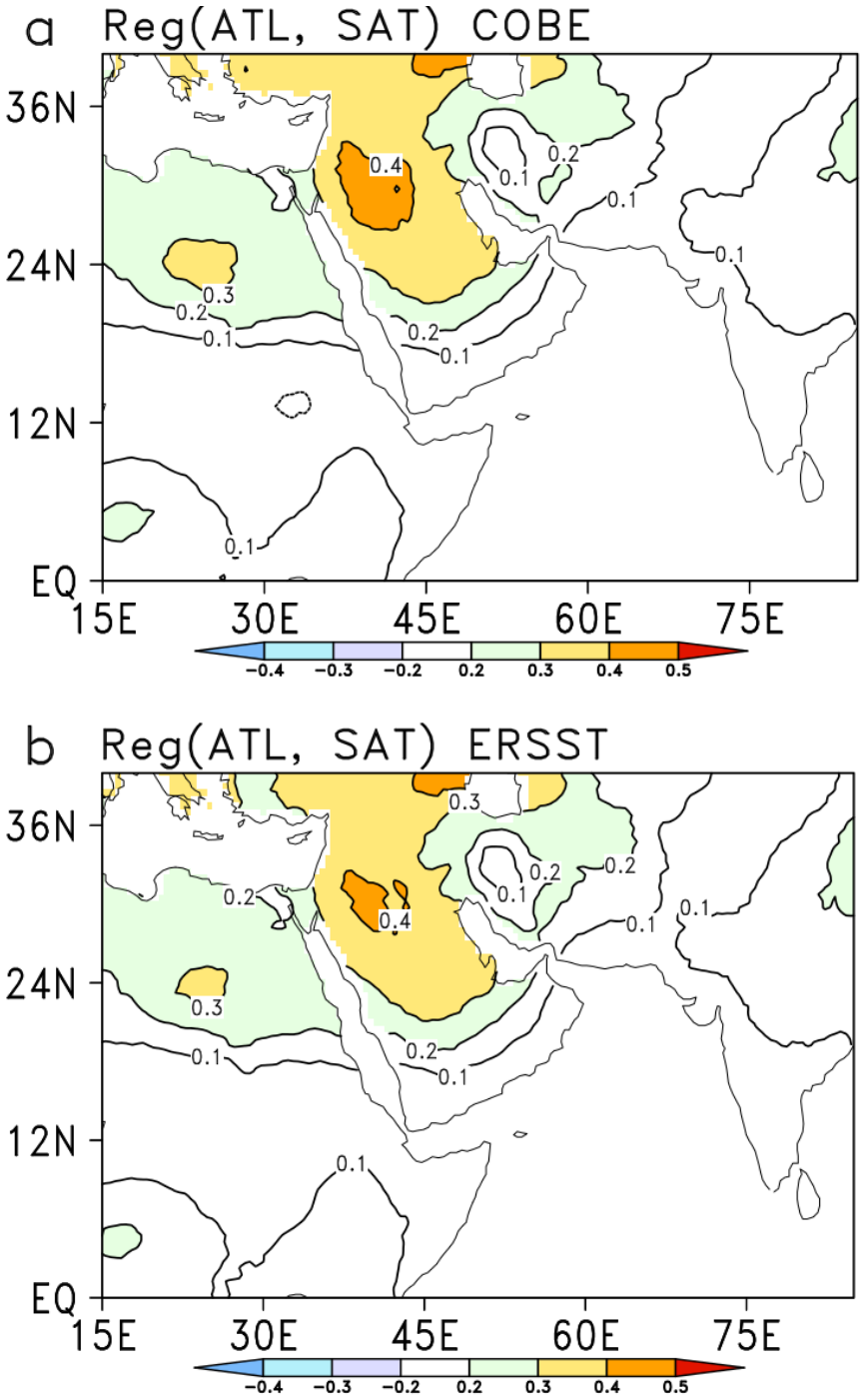
The supplementary figure 1a draws a topographic map focusing on the Middle East by using surface elevation. It is surrounded by a group of water bodies like Red Sea, Gulf of Aqaba, Arabian Sea, Arabian Gulf, Caspian Sea, Black Sea and Mediterranean Sea. The Arabian Gulf shows the shallowest depth among all other surrounding water bodies. The geologic formations underneath and across the Middle East are a major source of oil and gas, consumed locally and around the world.



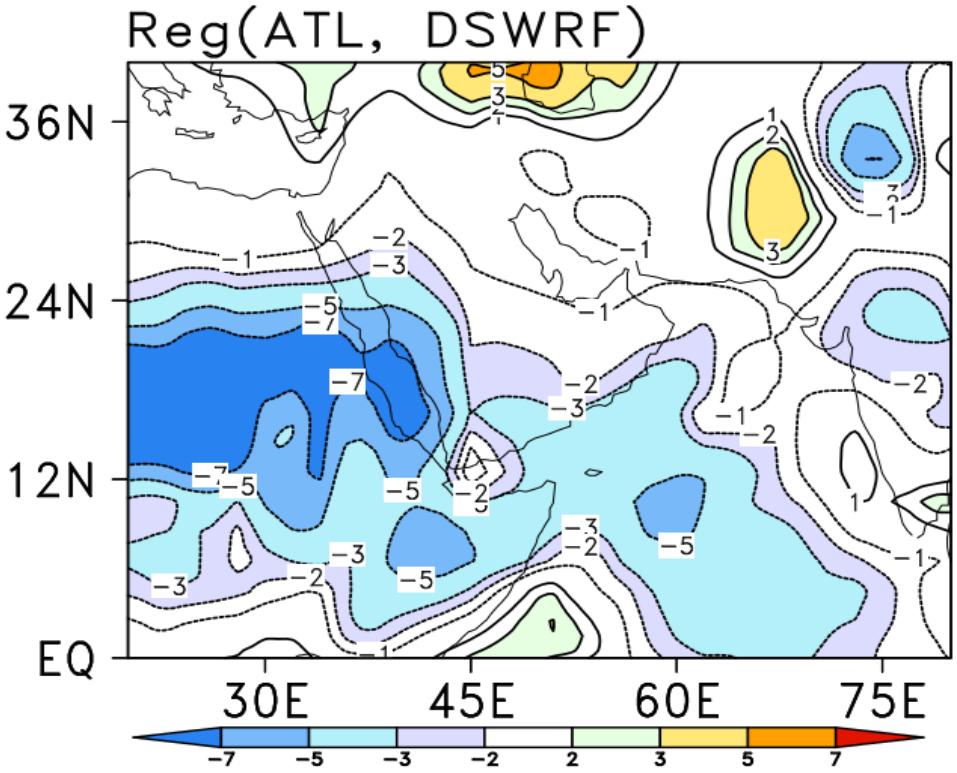
Supplementary Figure 1: (a) The Middle East (ME: 25°−60° E, 12° −40° N) and its neighborhoods. Topography of the ME landmass is indicated by the colors, with high elevations (meter) in dark color. The surrounding water bodies are described as single blue color. **(b)** The annual cycle of the ME surface air temperature. **(c)** Observed summer SAT climatology (shaded) and interannual variability (contour) and, **(d)** spatially averaged summer SAT (over ME: red curve) and SST (over the ATL: black curve) anomalies for the period 1948−2016. Detrended ME−SAT anomaly time series is represented by blue curve. The unit of temperature is °C.



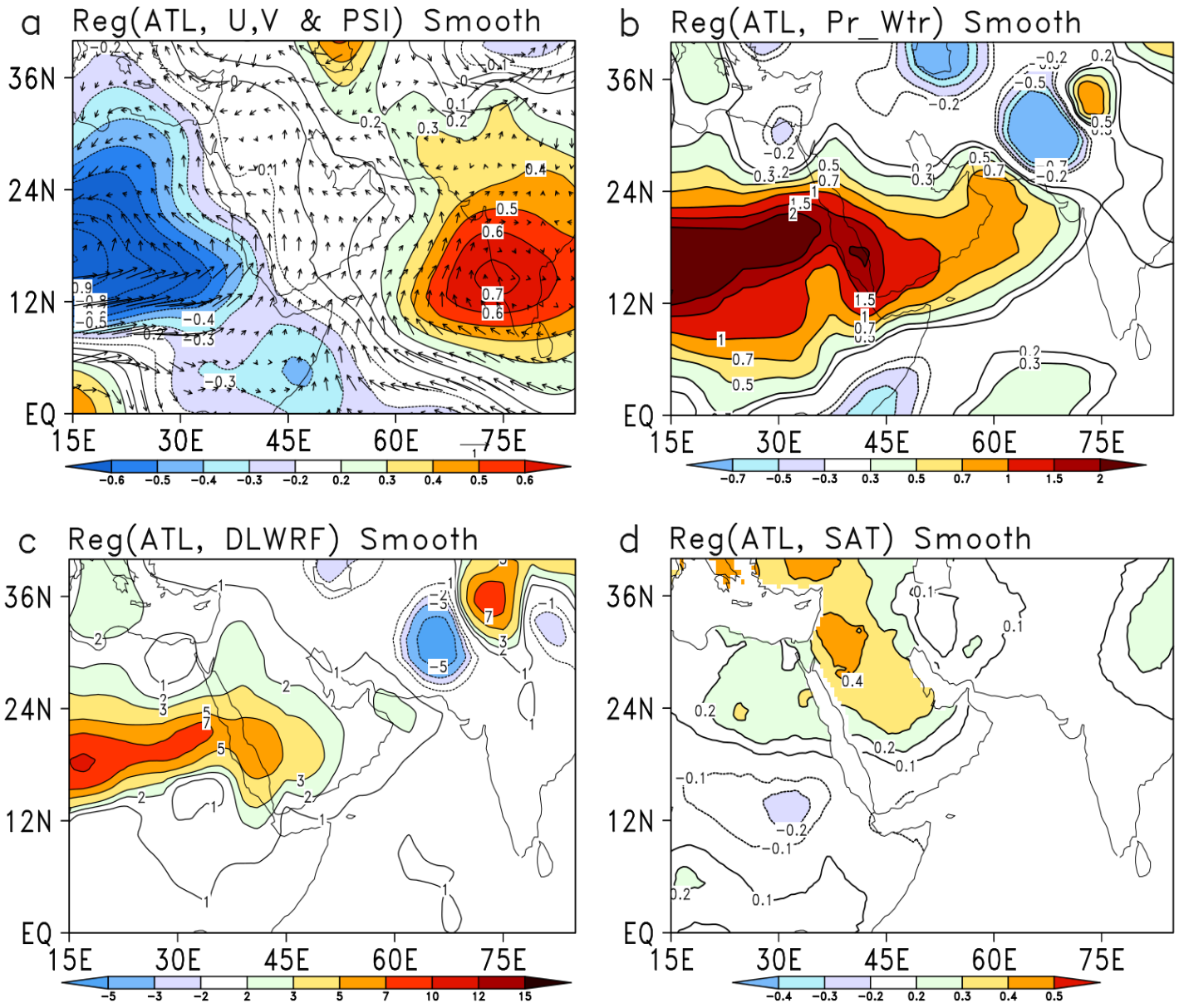
Supplementary Figure 2: Correlation of summer AP−SAT time series (spatially averaged over AP domain in this case) with global SSTs anomalies for full period (1948 to 2016) and two half periods (1961 to 1980 and 1991 to 2010) as defined in Almazroui et al. (2019).



Supplementary Figure 3: The regression of Atlantic SST index (spatially averaged SSTs anomalies in 75W−7.5W and 0−60N) onto SAT **(a)** COBE and **(b)** ERSST SST datasets. Color regions display significant values by using MC method with 95% confidence level.



Supplementary Figure 4: The regression of Atlantic SST index onto surface downward shortwave radiation flux (shaded: W m^{-2}). Color regions display significant values by using MC method with 95% confidence level.



Supplementary Figure 5: The regression of smoothed (11 year running mean) Atlantic SST index onto **(a)** eddy stream function (shaded: ×1e+06 m^2 s^{-1}) and winds at 850 hPa (vector: m s^{-1}), **(b)** precipitable water (shaded: kg m^{-2}), and **(c)** downward longwave radiation flux (shaded: W m^{-2}), and **(d)** SAT (shaded: ºC). Color regions display significant values by using MC method with 95% confidence level.

Reference:

Almazroui, M., Rashid, I.U., Saeed, S., & Islam, M.N. ENSO influence on summer temperature over Arabian Peninsula: role of mid-latitude circulation. Clim. Dyn. https://doi.org/10.1007/s00382-019-04848-4 (2019).