

# Abstract

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## **Spatiotemporal investigation of longterm seasonal temperature variability in Libya**

Throughout this work, spatial and temporal variations of seasonal surface air temperature have been investigated. Moreover, the effects of relative internal (teleconnection) and external (solar) forcing on surface air temperature variability have been examined. Seasonal temperature time series covering 30 different meteorological locations and lasting over the last century are considered. These locations are classified into two groups based on their spatial distribution. One represents Coast Libya Surface Air Temperature (CLSAT), contains 19 locations, and the other represents Desert Libya Surface Air Temperature (DLSAT), contains 11 locations. Average temperature departure test is applied to investigate the nature of temperature variations. Temperature trends are analyzed using the nonparametric Mann–Kendall test and their coefficients are calculated using Sen's slope estimate. Cross-correlation and spectral analysis techniques are also applied. Our results showed temperature deviation from average within a band of  $\pm 2^{\circ}\text{C}$  at coast region, while  $\pm 4^{\circ}\text{C}$  at desert region. Extreme behavior intensions between summer and winter temperatures at coast region are noticed. Segmentation process declared reversal cooling/warming behavior within temperature records for all seasons. Desert region shows warming trend for all seasons with higher coefficients than obtained at coast region. Results obtained for spectral analysis show different short and medium signals and concluded that not only the spectral properties are different for different geographical regions but also different for different climatic seasons on regional scale as well. Crosscorrelation results showed that highest influence for Rz upon coastal temperature is always in conjunction with highest influence of NAO upon coastal temperature during the period 1981–2010. Desert region does not obey this phenomenon, where highest temperature–NAO correlations at desert during autumn and winter seasons are not accompanied with highest correlations for temperature–Rz