

Fluctuations of Surface Air Temperature in The Eastern Mediterranean

Abstract

Changes in surface air temperature during the last century are widely discussed among researchers in the field of climatic change. Using various techniques, we investigate trend and periodicity of surface air temperature series from eight meteorological station in the Eastern Mediterranean. For the analysis we use the Mann-Kendall rank test, low-pass filtering, autocorrelation spectral analysis and maximum entropy spectral analysis. The later two tests are compared. The study is based on series over one hundred years in length for four stations, and over fifty years in length for the other.

Increasing and decreasing surface temperature trends were found. These trends, however, are only significant for Malta, Jerusalem, and Tripoli at 99% confidence level (positive trend) and for Amman at the 95% confidence level (negative trend). We also found inter decadal variations in surface air temperature including a fairly regular quasi 20 year oscillation, although its amplitude varied between different cycles. Period of warming began around 1910 at all stations. During the 1970s the annual mean temperature series exhibit warming, but this warming was not uniform, continuous or of the same order at all the stations.

The result of the autocorrelation spectral analysis and maximum entropy spectral analysis are similar, pointing to the reliability of the results. The quasi-biennial oscillation (QBO) exists at all stations during both increasing and decreasing trends. Similarly, a broad maximum from 3-8 years (related to El-Nino) is found at Malta, Athens, Jerusalem, Beirut, and Latakia. An inverse relationship between ENSO and the North Atlantic Oscillation (NAO) with surface air temperature over the Eastern Mediterranean is found at a highly significant confidence level.