

## **ABSTRACT**

In this study inter-annual patterns of the surface temperature are investigated in order to determine the major climatic fluctuations within the period 1943-1983. The spatial similarities in the observed fluctuation pattern were also investigated through principle component analysis. The major climatic components investigated included the trend and periodic fluctuations. The trend was investigated using smoothed curves derived from the five-term binomial filter. The t-test was also used to compare decadal (10 years) arithmetic averages. The periodic components were also investigated through correlogram and spectral analyses. Results from the study indicated that apart from Dar es Salam, all annual temperature records were declared homogeneous with both mass curves and the one sample run's test. No significant trend was observed at all other stations during the period 1943-1983. It was however, noted that relatively warm and cold episodes were recurrent during the period of study. The recurrent periods could be grouped in categories of 2-2.9 years, 4-6 years and 8-10.5 years. Spatial coherences in the inter-annual patterns were closely evident over some areas from the result of principal components analysis, which was capable of representing the spatial temperature characteristics with a maximum of five eigenvectors. The eigenvectors for about 80% of the total temperature variance