

Spatial and temporal trends in mean, maximum and minimum temperature in the Niger-South Basin, Nigeria

ABSTRACT

Analysis of trends in temperature can provide important information required for the understanding of climate in any geographical setting. In this study, trends of mean (TMEAN), maximum (TMAX) and minimum (TMIN) air temperature series were investigated based on monthly, seasonal and annual time-scales over the Niger-South Basin (NSB) during 1948-2008. Standard statistical tests and Mann-Kendall trend technique were used to analyse the temperature series. The results revealed a uniform warming over the basin with an average coefficient of variability of 1.36%. Three periods of warming and cooling were identified as: 1948-1956 (cooling), 1957-1978 (moderate warming) and 1979-2008 (increased warming) - with year 1998 being the warmest (TMEAN=27.8 °C), while 1975 was the coldest (TMEAN=26.2 °C). The warmest season was during March-April-May (spring) and June-July-August (summer) the coldest, whereas February and March were the warmest months of the year. Trends were positively significant over the basin on monthly, seasonal and annual bases for all series, while increasing trend in TMIN series was strongest. The trend in TMEAN, TMAX and TMIN averaged over the whole basin were 0.83, 0.79 and 0.90 °C per annum, respectively. The increasing warming trends for all series were also stronger in autumn and summer than in spring and winter. On the monthly basis, the highest TMEAN, TMAX and TMIN increase were in February (1.13 °C/yr), September (1.22 °C/yr) and January (1.41 °C/yr), respectively. On the whole, average increased warming over the entire basin was 0.83 °C per annum. The study showed that the increased warming in the basin that has been further intensified since the year 2001 can be attributed to the influence of global warming.

Keyword: Trend analysis; Temperature series; Mann-Kendal test; Climate change; NSB