



**VARIATION OF TOTAL ELECTRON CONTENT WITH SUNSPOT NUMBER DURING THE ASCENDING AND MAXIMUM PHASES OF SOLAR CYCLE 24 AT BIRNIN-KEBBI**

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**ABSTRACT**

Total Electron Content (TEC) is the total number of electrons present along a path between a satellite radio transmitter in space and receiver on ground. The satellite radio waves are affected by the presence of electrons in the earth's upper atmosphere (ionosphere). The more electrons in the path of the radio wave, the more the radio signal will be affected. For satellite to ground communication and satellite navigation, TEC is a good parameter to monitor for possible space weather impacts. TEC in the ionosphere is modified by changing solar Extreme Ultra-Violet (EUV) radiation, geomagnetic storms, and the atmospheric waves that propagate up from the lower atmosphere. The TEC will therefore depend on local time, latitude, longitude, season, geomagnetic conditions, solar cycle activity, and troposphere conditions.

A dual frequency GPS receiver at an equatorial station, Birnin-Kebbi in Northern Nigeria (geographic location: 12.64°N; 4.22°E), has been used to investigate variation of the total electron content (TEC) during the period of 2011 to 2014, corresponding to the ascending and maximum phases of solar cycle 24. We investigate the diurnal, seasonal and solar cycle dependence of GPS-TEC. The results show that TEC increases from a minimum at 0400 local time (LT) to maximum daytime peak between 1300 – 1600 LT and then decreases to a minimum value after sunset for all the years. Slight post-noon peaks in the daytime maximum and post-sunset decrease and enhancement is observed in some months. TEC were higher in the equinoxes than the solstices only in 2012. However, there was no consistent seasonal trend for the other three years. June solstice consistently recorded the lowest values for all the years. TEC increased steadily from the ascending phases (2011 – 2013) to the maximum phase (2014) of solar cycle 24.

**KEYWORDS:** TEC; variation; ascending phase; maximum phase; solar cycle 24.