

Evaluation – 31 July

The paper presents GPS-TEC data investigation at the equatorial region Birnin-Kebbi in Nigeria for the years 2011-2014, the rising and maximum phase of the 24th solar cycle. These data are compared with IRI-2016 ionospheric model to evaluate the confidence of this model in that region. The study presents new data analysis, comparing the TEC behavior in different time scales associated with diurnal, seasonal and solar cycle variations.

The authors improved a lot the paper after considering the reviewers comments and suggestions. The paper now needs only minor revisions to be acceptable for publication.

The comments refer to the last author version of July 2019.

Minor revisions

Abstract

Line 9: I suggest to use 'The ionosphere is the major error source' instead of 'Ionospheric error is the major error source..'

Line 21: Instead to say 'of some months', say the range of months or seasons or if is during the equinoxes or solstices.

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Line 52: 'posited' term could be 'posted' ?

Line 61: change ', and affect by time' by 'and is affected by time'.

Lines 61-62: Consider 'Recently, dual frequency GPS receiver is' instead of 'Recently, GPS receiver is'

Pag 4, Line 75: use 'c' instead 'C' to define the speed of light

Pag 9, Line 198: Change 'It well established known fact that during the day, the sun causes' by 'It is well established known fact that during the day, the Sun causes'

Pag 10, Line 210: change 'sunrise resulting to solar EUV' by 'sunrise due to solar EUV'

Pag 20, line 287: Change 'Figure 9 show plots of the seasonal variations' by 'Figure 9 show the seasonal variations'

Pa 21, line 303: Change 'strong phenomenon in low latitudes (Aggarwal et al., 2017). The equinoctial asymmetry has been explained' by 'strong phenomenon that occurs at low latitudes (Aggarwal et al., 2017), which has been explained'

Pag 23, line 334: Change 'that TEC values are high' by 'that reported higher TEC values'

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line 348: Change 'of TEC with solar cycle' by 'of TEC following the solar cycle variations'

lines 349-351: this text 'Our result is in good agreement with those of Chakrabarty et al. (2012) and D'ujanga et al. (2017). The former authors reported a direct solar effect on TEC while the latter authors observed that the trend in TEC follow that of solar parameters.' could be changed by 'Our result is in good agreement with those of Chakrabarty et al. (2012) and D'ujanga et al. (2017), which reported a direct solar cycle effect on TEC measurements'

lines 353-356: These two phrases could be deleted or better rewritten: 'Solar activity indicates the intensity of the solar electromagnetic radiations like wavelengths of X-rays and extreme ultraviolet (EUV) radiations. These radiations vary regularly and irregularly over time, larger variability tends to occur at very short wave length.'

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Legend Figure 10: it shows the monthly variations of OBS-TEC

Line 363-364: Change 'and many more reported that during low' by 'and many other works reported the same results during low'

Line 368: Change 'Balan et al. (1994) and Balan et al. (1996). Both authors in their research concluded' By 'Balan et al.(1994, 1996), which concluded'

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Lines 372-373: This phrase is out of context. Please rewrite it or delete.

Lines 377-380: Change 'OBS-TEC and IRI-2016 model rising from a minimum in the early hours of the day to a broad daytime maximum before falling steeply to a minimum after sunset for all years. Magnetic field tubes are rapidly filled up at dawn resulting in the increase of extreme ultraviolet (EUV) ionization (Anderson et al., 2004; D'ujanga et al., 2017).' BY 'OBS-TEC and IRI-2016 model rising from a minimum in the early hours of the day to a broad daytime maximum before falling steeply to a minimum after sunset for all years, due the photoionization increase produced by the solar extreme ultraviolet radiation (Anderson et al., 2004; D'ujanga et al., 2017).'

Lines 380-381: change 'OBS-TEC of many of the months were delayed till after-noon,' by 'OBS-TEC is often delayed when compared with IRI-2016 model, with the maximum occurring afternoon,'

Lines 388-390: change 'in the equinoxes and solstices as reported in the research of Fayose et al. (2012) working at Ilorin in the NEI and Eyelade et al. (2017) also working in the NEI.' By 'in the equinoxes and solstices in the NEI as also reported by Fayose et al. (2012) and Eyelade et al. (2017).'

Lines 391-392: solstices and equinoxes are not season, consider only, for example 'September equinox' instead of 'September equinox season'

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Line 397: You presented the monthly OBS-TEC and Rz and not annual.

Line 400: change 'with Rama Rao et al. (1985) that there' by 'with Rama Rao et al. (1985) showing that there'

About reference list

Malik et al 2016 is cited in the text but it is not in the reference list

Ayorinde et al 2016 is in the reference list but is not cited in the text