

Interactive comment on “Diurnal, seasonal and solar cycle variation of total electron content and comparison with the IRI-2016 model at Birnin Kebbi” by Aghogho Ogwala et al.

Anonymous Referee #2

Received and published: 18 March 2019

This review is based on the latest revised version of the paper posted on 12 March.

The paper presents observations of total electron content obtained from a GPS receiver station at equatorial latitudes in northern Nigeria. Diurnal, seasonal and solar cycle variations are discussed, and compared with the latest version of the IRI-2016 model. The results show that there are discrepancies between the observed TEC and the IRI modeled TEC during most of the day. The IRI-model is known to be best suited for midlatitudes where the station coverage is higher. Studies using observations from equatorial latitudes could therefore be an important contribution to understand variations in TEC in this region better and could be used for future development of the

C1

model. There are still some points in the results and discussion section that I think need to be clarified before the paper is published:

1. In the introduction section (L106-L126) it is mentioned a couple of other studies comparing observed TEC from equatorial latitudes with the IRI model. Do you see the same discrepancies between IRI-TEC and OBS-TEC as these previous studies, or are there any differences between your results? It would be good to also include a discussion of how the results of the present study compares with such previous studies in the “results and discussion” section.
2. L191-L192: Please clarify what you mean by OBS-TEC variations being indicated by the top-to-bottom error bars. Are these error bars representing the statistical variance? Or standard deviation?
3. L233-L237: From figure 1-4 it looks like the maximum occurs slightly post noon for the majority of the months. Could you check this? Also, please add a reference after the sentence regarding peak shifting in polar region on L237-238. How is this connected to your results from the equatorial region?
4. L246-L256: This paragraph is slightly confusing. In this paragraph you state that the IRI-2016 model predictions are only suitable between 0 and 5 LT for all years. However, as shown in figs 5-8 and as stated in L273-274 this time of day (4-5LT) is also when there is the highest percentage deviation. Which criteria are you using for deciding if the IRI predictions are suitable?
5. Figs 5-8 would be easier to read if you added some horizontal lines to figs 5-8 to mark zero deviation, and perhaps also for example ± 50 etc. In addition it would be nice to have the same y-axis range on all of these plots to more readily see the seasonal variations.
6. In L252 it would be good to mention what you mean by pre-midnight (later in the manuscript you specify pre-midnight as 18-23h).

C2

Technical corrections:

- L146: "receiver bias receiver interchannel bias" - insert "and" between "receiver bias" and "receiver interchannel bias"
- L174: "analysed using using the" - remove duplicate "using"
- L207: Please change from "Releigh" to "Rayleigh" in "Rayleigh-Taylor Instability"
- In figure 2b, there seems to be a misplaced y-label just below the legend.
- L296: Is this correct? I think the minimum was observed during June solstice, so this should change to "minimum and maximum seasonal VTEC values during June solstice and December solstice respectively"

Interactive comment on Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2018-134>, 2019.