Annales
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Discussions

Interactive comment on "Morphology of GPS and DPS-TEC Over an Equatorial Station: Validation of IRI and NeQuick 2 Models" by Olumide O. Odeyemi et al.

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We thank the Referee 2 for the thoughtful and helpful comments. The changes have been effected accordingly, and highlighted in red color. Please, find also the point by point response to the change made to your comment in the body of the manuscript.

(A)Line 176:.... Krishna software.. - Give reference and/or the place where it can be archived.

The place where it can be achieved has been suggested below. (Global Positioning System total electron content analysis application user's manual, 2009, institute for

Scientific Research, Boston College, Chestnut Hill, Massachusetts)

(B)Line 190: Instead of giving infinity, the upper height limit of the ionosonde topside profile must be given in the integral limits of second part.

The upper height limit of the ionosode topside has been rewritten as:

TEC=$\int_\textbf{0}hmF2Ne_B(dh) + \int_hmF\textbf{2}1000Ne_T(dh)$3

(C)Lines 200-201: refine the sentence about relation between UT and LT

The statement in Line 200-201 has been rewritten to show clearly the relationship between UT and LT The universal time (UT) is the time standard for the record of GPS and DPS data but we converted UT to local time (LT) by adding one hour to corresponding UT. Nigeria is 1 hour in advance of Greenwich mean time (GMT) thus, 0100 UT is the same as 0200 LT in Ilorin, Nigeria.

(D)Lines 229-332: the sentences are too monotonous. Must be rewritten

The sentences in Lines 229 - 332 have been written for $\Delta\_(GPS/DPS)$, $\Delta\_(GPS/IRI)$, and $\Delta\_(GPS/NeQ)$, represent the changed TEC between GPS-TEC and DPS-TEC, GPS-TEC and IRI-TEC, and GPS-TEC and NeQ-TEC, respectively while %($\Delta\_(GPS/DPS)$), %($\Delta\_(GPS/IRI)$), and %($\Delta\_(GPS/NeQ)$), represent the percentage deviation between GPS-TEC and DPS-TEC, GPS-TEC and IRI-TEC, and GPS-TEC and NeQ-TEC, respectively.

(E)Figure 5 title must be rewritten

The Figure 5 has been written as: Fig 1b Seasonal variations of GPS-TEC, DPS-TEC, IRI-TEC and NeQ-TEC (i) March Equinox (i) June Solstice (ii) September Equinox (ii) December Solstice in 2010 over Ilorin during quiet periods.

(F)Lines 369-370: It is not the interaction of electric and magnetic fields.

The statement in Lines 369-370 has been written as suggested by the Referee Thus,

the bite-out results from the vertical drift due to the combined effect of mutually perpendicular electric and magnetic fields on the plasma.

(G)The study is nominal comparison of TEC from different methods and model. Whereas the statement in lines 456-457 "This will reshape the model parameters for improved ionospheric modeling over Africa" is superstitious.

The statement on lines 456-457 has been rewritten to capture the parameters investigated. The investigation will improve the modeled TEC for better performance over African region.

(H)Figure 3b: Cross check the huge negative values in March or Dec. The huge negative values still fall on March after checking.

(I)I am attaching annotated manuscript with more corrections and suggestions.

All the attached corrections and suggestions in the annotated manuscript have been altered as suggested by the Referee. Please find the attached edited manuscript.

(J) The English suggestion.

We have improve the English significantly

(K)The introduction is too lengthy which must be reduced

The introduction the paper has been reduced

(L)The conclusion section must be rewritten outline main and new findings of the present study.

The conclusion has been rewritten as: (i)We have investigated and compared the variations of observed and modeled TEC over an equatorial station of Africa during just ascending phase cycle of low solar activity in the year 2010. Our findings show that both the observed and modeled TEC are solar zenith angle dependent. (ii)Our observation revealed faster sunrise increase in the modeled TEC relative to GPS-TEC

which suggest the misinterpretation of the topside Ne profile of the modeled TEC in order to incorporate the plasmaspheric electron content (PEC). (iii)We also found equal daytime TEC between observed TEC and modeled TEC suggesting that the model TEC could represent GPS-TEC in the absence of plasmaspheric TEC contribution. (iv)We attributed the inconspicuous bite-out in the GPS-TEC during the daytime to the quick refill of fountain effect by higher rate of plasma production at the magnetic equator around noontime. (v)The discrepancy between GPS-TEC and modeled TEC during the dusk period requires attention in particular around 0400 - 0500 LT that shows the highest percentage deviations. (vi) We also found that the overestimation of % ΔTECIRI-GPS in May and June at all hours of the day. (vii)Furthermore, the percentage deviations in DPS and modeled-TEC during dusk periods is always higher than their corresponding deviations during the daytime and the values of daytime deviation in DPS and NeQ-TEC are smaller compared to daytime deviation in IRI-TEC. This study was carried out during the quietest period of the year 2010; it will be of advantage to investigate and compare studies on the most disturbed days with our results. Moreover, additional stations around the equatorial region will be required to validate the latitudinal effect of the model TEC; this could improve the model parameters for better ionospheric modeling over African sector.

Please also note the supplement to this comment:
https://www.ann-geophys-discuss.net/angeo-2018-57/angeo-2018-57-AC2-supplement.pdf