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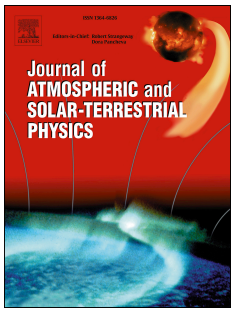

Investigation on slab-thickness and B0 over an equatorial station in Africa and comparison with IRI model

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Investigation on Slab-Thickness and B0 over an Equatorial Station in Africa and Comparison with IRI Model.

0.0 Abstract

The present study investigates the simultaneous morphologies of slab-thickness (τ) and thickness parameter (Bo) over Ilorin (8.50^0N, 4.68^0E; dip lat. 2.95), an equatorial station, during a year of low solar activity (2010). The τ is deduced from global positioning system total electron content (GPS-TEC) while the F2 peak electron density (NmF2), from digisonde portable sounder (DPS). The use of measured TEC for this type of investigation takes care of the inclusion of plasmaspheric electron content (PEC). The PEC distributions on the topside and bottomside electron density (Ne) profile add considerably to the genuine signatures of τ and Bo. Therefore, the dynamic contributions of the PEC need to be emphasized for the accurate prediction of the ionospheric models. Apart from daytime signatures of the τ and Bo which are not primarily influenced by PEC, we found that between two and three hours of pre-sunrise and dusk periods are mainly controlled by PEC which manifests as huge peaks in the τ and Bo. Also, our investigation reveals that the Bo profile is thicker than the τ profile during the pre-sunrise periods in June indicating partial flow or halt in PEC. The result revealed approximately the same values of τ and Bo around the sunrise period suggesting the absence or negligible PEC contributions. Our investigation also shows that there are maximum and minimum of the thickness in Bo and τ during the December solstice and June solstice, respectively. We also observed a moderate sunrise enhancement in τ that is not conspicuous in the Bo signature. On the relationship between the τ and Bo, we found a significant association between τ and Bo with the highest coefficient value observed during the June seasons indicating the possibility of predicting τ in the absence of Bo and vice-versa, especially during the June season. The validation of International Reference Ionosphere (IRI) model with observed τ and Bo revealed appreciable discrepancies between the model and observed values, particularly between the IRI-τ