Ionospheric-equivalent slab-thickness and peak height at the F2 region of an equatorial latitude over West Africa.

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At the equatorial latitude of a West African station (8.50^{o} N, 4.50^{o}E, dip lat. 2.95), we examined the concurrent slab thickness (τ) relative to peak electron density height (HmF2) at F2 layer during the low solar activity year 2010. Our observation revealed that τ is maximum and minimum during the daytime and dusk time, respectively which may indicate maximum and minimum scale height in τ through the daytime and nighttime, respectively. The positive and negative discrepancies between DPS-τ and GPS-τ could indicate flaws while inferring plasma topside scale height in the DPS model or failure to incorporate a reflection of the composition changes in the topside model of DPS-τ. The reflection of compositional change is reasonably captured around pre-sunrise and sunrise periods in May and July, respectively. Around 0100 - 0600 LT in June, we observed simultaneously reversed signatures in GPS-τ and DPS-τ with a pre-sunrise minimum and maximum, respectively at 0500 LT. During the dusk period, the significance of composition dynamics is not reflected in the DPS- τ. The combined relationship between τ and HmF2 gives a high correlation coefficient (CC), but CC during the daytime is continuously higher than CC during the entire 24 hours. The reduction in CC values during the 24 hours compared to daytime CC (0600 - 1800) could be due to the inaccuracy of the topside scale height in DPS compositional change in Ne. Thus, the higher CC between the τ and HmF2 could be used to improve the topside scale height around the height above the peak of the F2 region. We compared the experimental HmF2 with the IRI-HmF2 and found that the IRI-2016 model is still incapable of capturing the post-sunset observed HmF2 in all seasons.