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Evening and nighttime features of equatorial ionospheric F2 layer

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Abstract. We have used ionosonde observations recorded at Ibadan (7.4 degree North, 3.9 degree East) during the International Geophysical year (1957-58) to investigate evening and nighttime characteristic features of equatorial ionosphere during high solar flux and quiet magnetic conditions. We have also used International Reference Ionosphere model (IRI-2012) data. Our results show that the base of the ionosphere descends at a rate of -27.5 km/hr between 2000 LT and 0400 LT, whereas the observed bottomside peak of the ionosphere move down at a rate of -29.3 km/hr between 1900 and 0500 LT, while IRI2012 bottomside peak show -29.8 km/hr between 2000 LT and 0500 LT. The downward flow rate of plasma concentration between 1900 LT and 0500 LT and between 1800 LT and 0400 LT is approximately 0.040 electron per cubic metre per hour and 0.081 electron per cubic metre per hour, respectively for observed and for modeled NmF2. Month-by-month averaged altitudes (h'F, hmF2, and modeled hmF2) indicate significant local time variation. In addition, the month-by month variation indicates nighttime double crest of averaged peak height (hmF2) in the ionosonde measurements and in the IRI-2012 empirical model with a trough in June-August for data and In July for model. The monthly mean downward vertical drift velocities derived from local time variation of h'F and hmF2 together with global drift model essentially demonstrate much fluctuation. We found a "domed shaped" in modeled drift velocity, indicating equatorward plasma between April and September.

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