

Solar activity dependence of the nighttime topside ionosphere for the period 2000-2004

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We investigate the solar activity dependence of the nighttime low latitude topside ionosphere for the period of 2000-2004 during which average F 10.7 varied from over 200 to around 100. The result shows a good correlation between the plasma density variations and the solar activity changes for the long term as well as for the 27 day solar rotations. The ion and electron temperature changes are also seen to have good correlations with the solar activity variations. However, the values of these ionospheric parameters may differ from one another even for the same F 10.7 values. For example, the density during the low solar activity cycle is lower than that of the high solar activity for the same F 10.7 values. Seasonal variations are also studied and compared with IRI for future improvements of the model. We divide the longitude sectors into three according to the magnetic declination angles as the plasma transport along magnetic field lines is one of the dominant sources affecting energetics of the nighttime topside ionosphere. The IRI model, being less variable with no significant hemispheric asymmetry, differs from the observations especially when the solar activity is high. Also, the longitudinal variations are more significant in the observations while they are not clear in the IRI model. One of the main differences between the model and the observations is the effect of the zonal wind, which is observed to be significant in all seasons and causes large longitudinal variations.