

Longitudinal, seasonal, and solar activity variations of the nighttime topside ionosphere observed by DMSP F15

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Ion density and electron temperature measurements from the DMSP F15 at 840km altitude sun-synchronous polar orbit(21:30 LT) are examined to study the solar activity dependence of the low latitude nighttime topside ionosphere for the period of 2000-2004 during which average F10.7 varied from over 200 to around 100. The ion density and electron temperature show significant changes in proportion to the F10.7 values. However, the density and temperature during the high solar activity cycle are higher than those of the low solar activity for the same F10.7 values. That is the ionospheric parameters may be different from one another even for the same F10.7 values according to the solar activity cycle. Longitudinal and seasonal variations are also compared with IRI2001 model. We divide the longitude sectors into three according to the magnetic declination angles generating a condition for plasma transport along the field line. The longitudinal and seasonal variations are observed as significant, while they are less variable in the IRI2001 model. For example, the IRI2001 model has no significant hemispheric asymmetry contrary to the observations. These differences are probably caused by the effect of the zonal wind. Also, IRI2001 model does not show a large variation with the solar activity, especially in the electron temperature.