



Opposite Latitudinal Dependence of the Premidnight and Postmidnight Oscillations in the Electron Density of Midlatitude F Layer

Jin Wang

China University of Geosciences (Wuhan), Institute of Geophysics & Geomatics, Wuhan city, China
(wangjin1221@whu.edu.cn)

The dense observation points of the oblique-incidence ionosonde network in North China make it possible to discover the ionospheric regional variations with relatively high spatial resolution. The ionosonde network and the Beijing digisonde are used to investigate the ionospheric nighttime oscillations in January and February 2011. The electron density enhancements occurring before and after midnight present the obvious opposite latitudinal dependence in the time-latitude maps, which are composed by the differential critical frequency of F2 layer. The premidnight enhancements (PRMEs) appeared earlier in the north and then moved to south. The postmidnight enhancements (POMEs) did the opposite. The data analysis shows that the PRME was a part of the large-scale traveling ionospheric disturbance (LSTID), which may be produced by gravity waves. The southward propagation of the LSTIDs is considered to form the positive latitudinal dependence of the wave peaks and troughs. The postmidnight F layer oscillation was composed by a single enhancement and a single decline following it. The westward electric field-induced $E \times B$ drift, which pushed the F layer to lower altitudes with higher recombination loss, was most likely to compress the plasma and produce the POMEs. Along with the continuously dropping of the layer, the recombination loss exceeded the density increase due to the compression effect and then the electron density decline appeared.