Geophysical Research Abstracts, Vol. 8, 04653, 2006
SRef-ID: 1607-7962/gra/EGU06-A-04653

Numerical modeling of the forming of the enhanced electron density regions in the night-time middle-latitude ionospheric F2-layer and in the plasmasphere

A.A. Namgaladze (1,2), M.A. Knyazeva (1)

(1) Murmansk State Technical University, Russia, (2) Polar Geophysical Institute, Murmansk, Russia (namgaladze@mstu.edu.ru)

The forming of the enhanced electron density regions in the night-time middle-latitude ionospheric F2-layer and in the plasmasphere were modeled with using the global Upper Atmosphere Model (UAM) for eight selected days representing four seasons and two levels of the solar activity. The results of the UAM calculations were compared with the empirical IRI-2001 model predictions. Both models show the noticeable MLT, UT, seasonal and solar activity effects: the enhanced electron density regions are located in the 19-05 MLT sector at the 30-60˚ magnetic latitudes. They move from high to low latitudes with increasing MLT under high solar activity. Under low solar activity they are located at the 40-45˚ magnetic latitudes practically independent on MLT. They are better expressed in the summer conditions under high solar activity and in the equinoxes under low solar activity in the 12-24UT sector. They extend to the plasmasphere along the geomagnetic field lines forming the tubes with enhanced electron density. The influence of the thermospheric winds and electric fields on the forming of the enhanced electron density regions has been investigated. It has been shown that the electromagnetic drift influences on the latitudinal location of the high-latitude sides of the enhanced electron density regions, moving them to the lower latitudes. The displacement of these regions from poles is proportional of the drift velocity value. It has been found that the main cause of the occurrence of the night middle-latitude increases of the electron density is the equatorward thermospheric wind driving the F2-layer plasma to the higher altitudes thus decreasing the ion loss rate.

This work was supported by the Grant No. 05-05-97511 of Russian Foundation for Basic Research.