

THE RADAR MEASUREMENTS OF ELECTRON DENSITY IN THE LOWER IONOSPHERE

V.D. Tereshchenko, V.A. Tereshchenko, E.B. Vasiljev,
A.M. Tarichenko (Polar Geophysical Institute, Murmansk, Russia)

The electron density altitude profile is most important quantity for the correct representation about the Earth ionosphere. This paper describes some results, which were obtained by the radar vertical sounding technique at 2.7 MHz for the experiment of 1999 at the observatory Tumanny (69.0°N, 35.7°E). The calculation of the electron density is executed by the analysis of the ordinary and extraordinary partial reflected radio waves. The method of partial reflection is also known as a weak Fresnel scattering which is generated on sharp gradients of a refractive index.

During the period of the measurements of 1999 it were collected the electron density data at the altitude interval from 70 to 100 km. The distinguishing feature of the summer data is a registration of the low electron density areas at a mesopause height. However, the radioreflections from the areas have an increased intense, and the lifetime of the areas is from one minute to some hours.

The electron density minimum near the polar mesopause was observed during short-term rocket experiments only. It is now discussed a possible relation of the MF intensive radioreflexion in Tumanny and the HF radioechoes in Andenes known as PMSE (Polar Mesosphere Summer Echo). The nature of the phenomena is not clear now and demands of a further research. But it is possible that the electron density degradation and the growth of the radioreflexion intense are related with an adhesion of the electrons to aerosol or dust and with a generation of negative ions, which are available in the lower ionosphere. Besides, it can be during a minimum of the neutral gas temperature because it can decrease a quantity of a nitric oxide formation and, consequently, the electron density.