Study of the ionospheric D-region using partial reflections at middle and high latitudes

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Investigations of D-layer ionosphere by means of partial reflection technique are carried out at measuring facilities located in different latitudinal regions: in Vasil'sursk near Nizhniy Novgorod (56.1°N, 46.1°E) and in Tumanny (Murmansk region, 69.0°N, 35.7°E). Quantitative estimates are obtained for electron density values in the polar and mid-latitude D-region, and distinctions in these values are revealed.
It is shown, that in the summer period in auroral zone the electron concentration at heights 70 - 80 km approximately in 2 times are higher, than in middle latitudes. The diurnal changes of the electron concentration of midlatitude ionosphere follow to a cosine of the Sun zenith corner with an exponent, close to unity. The change of the electron concentration at the altitude 80 km in an irradiated period at high latitudes, but in quiet conditions, submits to the same law. The detected legitimacy in behaviour of the electron concentration reflects the fact, that the linear mechanism of electron losses acts at this height. The analysis of the radar measurements of electron density in the upper D-region, carried out for height of 80 km, has confirmed deductions received earlier on the basis of the rocket data. In particular was shown, that the strong straggling of values of an electron concentration (up to two orders of magnitude) is observed in polar ionosphere at a fixed zenith corner, which depends on a season of observations and zenith corner values.

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