

DEVELOPMENT OF TEC FLUCTUATIONS AT POLAR IONOSPHERE: NORTHERN AND SOUTHERN HEMISPHERES

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In this report analyses of similarities and differences of TEC fluctuations occurrence at north and south polar ionosphere are presented.

The GPS measurements of IGS network were used to study the occurrence of TEC fluctuations at north and south high latitude ionosphere during geomagnetic disturbances. For the northern hemisphere we selected GPS stations located higher than 55N Corrected Geomagnetic Latitude (CGL) at different longitudes. For the southern hemisphere, Antarctic permanent GPS stations were used. Dual-frequency GPS measurements along individual satellite passes served as raw data. As a measure of fluctuation activity the rate of TEC (ROT) was used and fluctuation intensity was evaluated using ROTI index.

Using daily GPS measurements from all selected stations, the images of spatial and temporal behavior of TEC fluctuations (in Corrected Geomagnetic Coordinate and local geomagnetic time) were formed. Similarly to auroral oval the images demonstrate an irregularity oval. The occurrence of irregularity oval relates with auroral oval, cusp and polar cap. During storm TEC fluctuation activity and intensity essentially increase. The irregularity oval expands equatorward with increase of magnetic activity. As a whole the dynamics irregularity oval in both hemispheres is similarly in storm time, however we found some difference in development of TEC fluctuations between northern and southern ionosphere. They may be caused by seasonal features of excitation of irregularities in high latitude ionosphere. Daily pattern of the irregularities oval was controlled by the motion of the station location into auroral oval. Maximal intensity of TEC fluctuations took place over polar stations. The strong TEC fluctuations were associated with polar patches. The study has shown that the existing high-latitudes GPS stations can provide a permanent monitoring of the irregularity oval near real time.

TEC fluctuations, polar ionosphere

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