

Analysis of the short scale fluctuations of total electron content using the GPS-TEC one second data

Akimasa Tachibana[1]; Akinori Saito[2]; Michi Nishioka[2]

[1] SPEL, Kyoto-University

; [2] Dept. of Geophysics, Kyoto Univ.

Characteristics of the shorter scale fluctuations of Total Electron Content (TEC) than five minutes.

Ionospheric electron density were explored using the GPS data. Electric density fluctuations are interpreted to be generated by the atmospheric wave or the plasma instabilities. It is known that the atmospheric gravity wave whose frequency is higher than the Brunt-Visala frequency cannot propagate to vertical direction in the atmosphere. Because the Brunt-Visala frequency is ten minutes in the thermosphere, the atmospheric wave whose that cause electric density fluctuations whose period is shorter than 5 minutes infrasonic wave.

It was found that the short period fluctuations of TEC were not detected during the daytime, and several events were detected during the nighttime. These fluctuations were found propagate to south-west direction. While the noise level of the TEC measurement by the ground-base GPS receiver show 0.05TECU ($\text{TECU}: 10^{16} \text{electrons m}^{-2}$), the amplitude of strong fluctuations were up to 0.4TECU .

The south-westward propagation is the common characteristics with Medium Scale Traveling Ionospheric Disturbance (MSTID) and the strong short-scale fluctuation was detected by the present of MSTID.

This result indicates that the large scale structure such as MSTID contained the smaller scale irregularities, and propagate together.

But the strong short scale fluctuation was not evenly detected when MSTID were presented and the wavefront of the strong short scale fluctuation is not like the wavefront of MSTID. At this point, it is not clear the source. We will report the result that comparison of the strong short scale fluctuation and electron density in E layer.