

Statistical characteristics of medium-scale traveling ionospheric disturbances observed by an airglow imager at Syowa Station, Antarctica

Takeshi Minoura¹, Shin Suzuki¹, Kazuo Shiokawa¹, Yuichi Otsuka¹, Mitsumu K. Ejiri², Takuji Nakamura²

¹*Solar-Terrestrial Environment Laboratory, Nagoya University, Nagoya, Japan,*

²*National Institute of Polar Research, Tachikawa, Japan*

We investigate statistical characteristics of nighttime medium-scale traveling ionospheric disturbances (MSTIDs) based on airglow imaging observations over Antarctica. Although the MSTIDs are frequently observed by radio and optical instruments, their generation and propagation mechanisms are not clear yet. To date, quite a few observations of MSTIDs have been carried out especially in the middle and low latitudes; they predominantly had a northeast-southwest frontal structure and propagated northwestward in Northern hemisphere. However, little is known about such characteristics of MSTIDs over Antarctica. We made airglow imaging observations of MSTID for 7 months from September to March 2011 at Syowa Station, Antarctica. We found 28 MSTID events using 630-nm airglow keograms. The observed MSTIDs had a horizontal wavelength of 50 - 300 km (average: 194 km), horizontal phase speed of 30 - 90 m/s (average: 49 m/s), and period (average: 58 min). The horizontal propagation directions were predominantly northwestward. The occurrence of MSTIDs over Syowa Station, Antarctica, shows strong local time dependence. Most of the MSTIDs were observed in the premidnight. The direction of wave front of the observed MSTIDs elongating in the northeast-southwest direction is consistent with that predicted from the theory of Perkins instability which is a possible mechanism of MSTID generation.