

Statistical characteristics of MSTIDs observed by 630-nm airglow imager and HF-radar echoes at Paratunka, Russia

MINOURA, Takeshi^{1*} ; SUZUKI, Shin¹ ; SHIOKAWA, Kazuo¹ ; OTSUKA, Yuichi¹ ; NISHITANI, Nozomu¹ ; HOSOKAWA, Keisuke²

¹Solar-Terrestrial Environment Laboratory, Nagoya University, ²Department of Communication Engineering and Informatics, University of Electro-Communications

Medium-scale traveling ionospheric disturbances (MSTIDs), which typically have a horizontal scale of 100-500 km and a period of ~1 h, are frequently observed in the F region ionosphere at middle latitudes. To date, quite a few observations of MSTIDs have been carried out especially in the middle latitudes; they predominantly had a northwest-southeast, (northeast-southwest) frontal structure and propagated southwestward (northeastward) in the northern (southern) hemisphere, however their generation and propagation mechanisms are not clear yet. Suzuki et al. [2009] investigated two dimensional characteristics of a nighttime MSTID using the SuperDARN Hokkaido HF radar at Rikubetsu, (43.5 N, 143.6 E), Japan, and an OI 630-nm airglow imager located at Paratunka (53.0 N, 158.2 E), Russia, within the radar field of view (FOV). The Doppler velocities of MSTID echoes observed by the SuperDARN radar showed systematic polarity changes which were consistent with airglow intensity variations. The electric field estimated from the airglow and SuperDARN observations, however, seems to be improbable and the E-F coupling processes would be important to explain the inconsistency. We investigated statistical characteristics of nighttime MSTIDs. Based on the coordinated airglow and SuperDARN measurements from 2011 to 2013, we investigated the relation between the MSTID amplitudes in the 630-nm airglow intensity and the Doppler velocities of the FAI echoes associated with the MSTID pattern. This study may give an observational insight into the E-F coupling quantitatively.

In this presentation, we will report the statistics of the relation of the FAI echoes and airglow signatures of the observed MSTIDs (5 events), which showed spatially conjugation in the radar FOV.

Keywords: airglow imager, Hokkaido SuperDARN radar, MSTID