

Statistical study of seasonal dependence of MSTID occurrence and propagation velocity using the SuperDARN Hokkaido East HF radar

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We present the results of the statistical study of medium-scale traveling ionospheric disturbances (MSTIDs) using the SuperDARN Hokkaido East (43.53°N, 143.61°E) high-frequency (HF) radar data from 2009 to 2018. We applied a three-dimensional fast Fourier transform method developed by Matsuda et al. (2014) to the dataset and analyzed the diurnal and seasonal dependences of the propagation direction and horizontal phase velocity of MSTIDs. Southwestward propagating MSTIDs are common during winter in the nighttime and southward propagating MSTIDs are common during winter and equinoxes in the daytime. Although rare in comparison with the southwestward propagating MSTIDs, certain number of northward propagating MSTID events are found. We also found a clear negative correlation between the yearly power spectral density of nighttime MSTIDs and F10.7 solar flux index. This negative correlation can be explained in terms of the linear growth rate of the Perkins instability.

Keywords: MSTID, SuperDARN radar