

Statistical analysis of local time dependence of MSTID characteristics using the SuperDARN pair of radars

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We conduct a statistical analysis on medium-scale traveling ionospheric disturbances (MSTIDs) using the Super Dual Auroral Radar Network (SuperDARN) Hokkaido East (43.53°N, 143.61°E) high-frequency (HF) radar data from 2009 to 2019 and the SuperDARN Hokkaido West (43.54°N, 143.61°E) high-frequency (HF) radar data from 2016 to 2019. We applied a three-dimensional fast Fourier transform (3-D FFT) method developed by Matsuda et al. (2014) to the dataset to deduce wave characteristics of the observed MSTIDs. This study focuses on the local time and solar activity dependence of the MSTIDs. We find that the propagation direction of MSTIDs gradually rotates clockwise as time advances during both daytime and nighttime. These changes can be explained by their respective generation mechanisms. We also find a clear negative correlation between the yearly-averaged power spectral density of nighttime MSTIDs and the F10.7 solar flux index. We consider that the relationship between the linear growth rate of the Perkins instability and solar activity causes this negative correlation.

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