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High-frequency fluctuations of the vertical ion speed measured with the EISCAT radar in the lower ionosphere

Shin-ichiro Oyama^{1*}, Junichi Kurihara², Takuo Tsuda¹

¹STEL, Nagoya University, ²Hokkaido University

An important aspect of the coupled thermosphere-ionosphere system at high latitudes is to know vertical motions in the lower thermosphere/ionosphere. While much is already known about the average characteristics of the system in this field, the subject has not yet been adequately investigated, in particular, the high-frequency fluctuations. The Incoherent-Scatter (IS) radar is the best diagnostic instrument to measure the vertical motion in the lower ionosphere because of its accuracy and the height-resolved data. We made statistical analysis by using data of the vertical ion speed measured with the EISCAT (European Incoherent Scatter) radar fixed to look in the vertical direction. The initial result suggests that (1) amplitudes of the vertical ion-speed fluctuation increase with the geomagnetic activity level, (2) the electric-field oscillation can cause the vertical ion-speed fluctuations. Furthermore, a comparison study suggests that the activity of the vertical ion-speed fluctuation appears to have some relationships with that of the pulsation in the geomagnetic field.

Keywords: Ionosphere, Thermosphere, High Latitude, Incoherent-Scatter Radar, EISCAT radar