

Transmission of the magnetospheric electric fields to the middle and low latitude ionosphere as observed by the Hokkaido SuperDARN radar and HF Doppler sounders

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The quasi-periodic DP2 fluctuations have been observed by magnetometers at high latitudes and dayside equator [Nishida, 1968] and their occurrence is simultaneous within the temporal resolution of 25s [Kikuchi et al., 1996]. The equatorial DP2 fluctuations are composed of the eastward electrojet (EEJ) and westward counter-electrojet (CEJ), which are caused by the convection and overshielding electric fields, respectively [Kikuchi et al., 2010]. In the present paper, we show that the DP2 electric fields were detected by the Hokkaido SuperDARN radar and HF Doppler sounder at middle and low latitudes, respectively on both the day- and night-sides. We also show that the DP2 electric fields induced the EEJ/CEJ in the nighttime equatorial ionosphere, which are in opposite direction to those on the dayside. We further confirmed the evening anomaly with the electric fields being in the same direction as in the day. All the local time and latitude features of the DP2 electric fields are the same as those of the geomagnetic sudden commencements [Kikuchi et al., 2016]. We suggest that the electric field and currents with periods ranging from 1 min to hours are associated with the electric potentials transmitted on the magnetosphere-ionosphere-ground transmission line [Kikuchi, 2014] on both the day- and night-sides.

References

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Keywords: middle and low latitude ionosphere, magnetospheric electric field, ionospheric electric field, magnetosphere-ionosphere-ground transmission line model, quasi-periodic DP2 fluctuations