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Relationship between low latitude electric field and global currents during geomagnetic pulsations

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The PC5 is often observed at low latitude with enhanced amplitude at the dayside dip equator, consistent with the DP2 currents driven by the dawn-dusk electric field [Motoba et al., 2002]. The electric field associated with the DP2 currents has been observed by the HF Doppler measurements at low latitude [Motoba et al., 2004]. In the present study, we show that the HF Doppler frequency deviations at low latitude are out of phase with the equatorial PC5 in the same meridian in the period range of 1-10 min. The PC5 at the nightside low latitude shows little latitudinal change, implying major contribution of the compressional MHD waves propagated from the magnetosphere. However, appreciable currents were found to be driven by the dawn-dusk electric field in the nightside equatorial ionosphere. These results raise an issue on the dynamo for the PC5 which supplies the electric field and currents in the ionosphere.

Keywords: PC5 pulsation, HF Doppler frequency, ionospheric electric field and current, PC5 dynamo