

## Overshielding Electric Fields at Low Latitude as Observed with the HF Doppler Measurements

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The convection electric field penetrates from the polar ionosphere to low latitude and drives the DP2 currents in the global ionosphere with an intensified equatorial electrojet (EEJ). The electric field often reverses its direction, that is, the overshielding occurs and causes the equatorial counter electrojet (CEJ) during storm and substorms. The overshielding electric field has been observed at the equator with the incoherent scatter radar in Jicamarca and SuperDARN radars in mid latitude. In low latitude, on the other hand, the HF Doppler measurements have been used to detect the electric field associated with the short-period disturbances such as the sudden commencements and geomagnetic pulsations (1-10min), but the overshielding electric field with time scales of several 10s of min have not been reported. To detect the overshielding electric field in the low latitude ionosphere, we analyzed the Doppler frequency of the HF radio signals propagated over 120 km in Japan at frequencies of 5 and 8 MHz. We compared the Doppler frequency deviations with the equatorial EEJ/CEJ and found that the overshielding electric field is comparable to or even stronger than the convection electric field. These results suggest that the overshielding electric field would play an important role in the ionospheric disturbances at low latitude.

Keywords: ionospheric convection, overshielding electric field, equatorial counter electrojet, HF doppler, low latitude ionosphere