The convection electric field is significantly enhanced in the magnetosphere by the cusp dynamo which is activated by the southward interplanetary magnetic field (IMF) during storm main phase. The convection electric field is a potential electric field which transmits to the polar ionosphere with the Region-1 field-aligned currents (R1 FACs) and then to the low latitude ionosphere near-instantaneously by the Earth-ionosphere waveguide. The transmitted electric field drives DP2 currents in the global ionosphere, and causes an enhancement of the equatorial electrojet (EEJ) and dramatic changes in the F-region ionosphere at low latitude and equator. The convection electric field further transmits into the inner magnetosphere and activates another dynamo which drives the R2 FACs responsible for the overshielding electric field at low latitude. During storm recovery phase, the overshielding causes the counterelectrojet (CEJ) at the dayside dip equator and ionospheric changes such as disappearance of the prereversal enhancement. In this paper, we show that the quasi-periodic DP2 fluctuations are contributed alternately by the convection and overshielding electric fields. The R2 FACs are recognized as reverse ionospheric convection vortices equatorward of the large-scale two cell convection as observed by SuperDARN. It is also found that the overshielding occurs during the storm main phase when substorm occur. The disturbance dynamo is another important source of the CEJ. Separation of these two dynamos remains a crucial issue in the magnetosphere-low latitude ionosphere coupling.