

Formation of FAC -Cowling channel connecting from polar to equatorial ionosphere

Akimasa Yoshikawa[1]; Shinichi Ohtani[2]; Aoi Nakamizo[3]; Teiji Uozumi[4]; Yoshimasa Tanaka[5]

[1] Dept. of Earth and Planetary Sci., Kyushu Univ.; [2] JHU/APL; [3] STEL, Nagoya Univ; [4] ICSWSE, Kyushu Univ.; [5] NIPR

Possible mechanism for formation of global Cowling channel from polar to equatorial ionosphere along the dawn and dusk terminator line is discussed. In our model, the global (primary) Hall current accompanied by the two-cell type convection has divergent component when they across the conductivity gradient region at the terminator-line and resultant polarization charge are induced along it. The secondary electric field accompanied by this induced charge generates the secondary Hall current, which flows along the terminator line and also diverges when they across it. The induced secondary charges at the end of equator

side produces the electric field along the magnetic dip equator line and becomes the driver of the equatorial electrojet or counter-electrojet

components according to the sign of their polarization charge. Resultantly, the global Cowling channel connecting between polar to equatorial ionosphere via the terminator-line and magnetic-dip equator could be formed. This mechanism can

be applied to the equatorial electrojet disturbances accompanied by the solar wind variations such as DP2-type magnetic field disturbances and many phenomena associate the equatorial enhancement and depression of the geomagnetic field disturbances.