

Global ionospheric currents during the geomagnetic storm

Kumiko Hashimoto[1], Takashi Kikuchi[2]

[1] CRL, [2] Communications Res. Lab.

The amplitude of the geomagnetic storm on Nov 6, 2001 was anomalously amplified at the dayside dip equator as compared with the amplitude at low latitudes, which was caused by an arrival of the solar wind shock with southward IMF of amplitude of 50 nT. The geomagnetic field started to decrease immediately after the SC at low latitude by an amount of 300 nT, while the amplitude of the storm was up to 700 nT at the dayside dip equator. The equatorial enhancement of the geomagnetic storm implies a superposition of the ionospheric currents amplified at the dayside dip equator on the magnetic field disturbances due to the magnetospheric currents. By subtracting the geomagnetic field at low latitudes from the equatorial magnetic field, we define the ionospheric current component (DP component) of the geomagnetic storm. It is found that the DP current in the dayside equatorial ionosphere is eastward during the main phase of the storm (2h), while it was westward during the initial part (2h) of the recovery phase. The DP currents during the main and recovery phases must be caused by the dawn-to-dusk and dusk-to-dawn electric fields associated with the R1 and R2 FACs, respectively. This feature resembles the successive development of the convection electric field and over-shielding electric field during the substorm as demonstrated by Kikuchi et al. (JGR2000,p.23251).