

Seasonal variation of equivalent current in the polar ionosphere

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We have statistically studied an equivalent current system in the polar ionosphere derived from ground-based magnetometer network. It is well known that the ionospheric current system forms a twin-vortex pattern with flow cells on the dawn and dusk sides. The anti-sunward current flow in the polar cap region tends to be tilted toward dawn even during negative IMF-By condition. This deformation of the current pattern is generally interpreted to be caused by non-uniform ionospheric conductivity.

Our results show that the current intensity is greater in summer than in winter and the tilt angle of the current flow is greater in winter than in summer. Furthermore, we found that diurnal variation of the magnetic field in the polar cap region averaged during the geomagnetically quiet condition is similar to the solar quiet (Sq) variation observed at low to middle latitudes. These results imply a possibility that the ionospheric current system in the polar region may be affected by the Sq current system.

Keywords: ionospheric current system, polar ionosphere, Sq current system, magnetometer network