The Dayside Field-aligned Currents Source Regions

Simon Wing[1], Shin I. Ohtani[1], Jay Johnson[2], Tomoyuki Higuchi[3], Genta Ueno[3], Patrick T. Newell[1], and James Weygand[3]
[1]*The Johns Hopkins University Applied Physics Laboratory, Laurel, Maryland, USA*
[2]*Princeton University Plasma Physics Lab, Princeton, New Jersey, USA*
[3]*Institute of Statistical Mathematics, Tokyo, Japan*

The dayside field-aligned currents source regions were identified. The polarities and densities of large scale field-aligned currents were determined from the DMSP magnetometer data 1983-2005. The magnetospheric source regions of the field-aligned currents were determined from the simultaneously observed particle precipitations from the DMSP SSJ4. Higher proportion of region-1 and region-0 currents originate from LLBL during northward IMF than during southward IMF. In the northern hemisphere, when IMF By > 0, the pre-noon region-1 pattern shifts toward post-noon whereas when IMF By< 0, the post-noon region-1 pattern shifts toward prenoon. In the southern hemisphere, the reverse is found. The ion westward and electron eastward drifts contribute to the prenoon-postnoon asymmetry of the source regions. The relationships between the field-aligned currents and the particle precipitation fluxes and energies on the dayside were explored and identified. The upward field-aligned current densities are proportional with precipitating electron differential energy fluxes. However, in the upward field-aligned currents, there is a big difference between the precipitating electrons that originate in the LLBL than in the BPS or CPS regions. For a given current density, the electron energy fluxes are lower in the LLBL than in the BPS and CPS.