Ionospheric conductivity dependence of dayside field-aligned current systems: Statistical study with DMSP-F7

Kentarou Haraguchi[1], Hideaki Kawano[1], Kiyohumi Yumoto[2], Shin-ichi Ohtani[3], Tomoyuki Higuchi[4], Genta Ueno[5]

[1] Earth and Planetary Sci., Kyushu Univ., [2] Space Environ. Res. Center, Kyushu Univ., [3] JHU/APL, [4] Inst. Stat. Math., [5] ISM

The present study statistically examines the dependence of the intensities of dayside (MLT=8-12 hr) large-scale field-aligned currents (FACs) on the ionospheric conduct1ivity by using the summary data of DMSP-F7 constructed by the procedure of Higuchi and Ohtani (2000). We have newly found that, in the midday region, R1 and R0 have higher correlation between the ionospheric conductivity and FAC intensity than R2, suggesting that R0 and R1 are driven by a more voltage-like source than R2. This result is consistent with the idea that R1 and R0 are driven by the interaction between the solar wind and the open magnetospheric magnetic field. We have also found that dayside FAC intensities are latitudinally well balanced when they have a three-sheet structure (R0, R1 and R2), but not balanced when they have a two-sheet structure (R1 and R2), so that the net current has the polarity of R1; this suggests a possibility that R1 consists of two systems, that we call v-R1 and c-R1 here, having the characteristics of a voltage source and a current source, respectively. That is, for the three-sheet structure, c-R1 is closed with R2 and v-R1 is closed with R0. On the other hand for the two-sheet structure, v-R1 is not latitudinally closed.