Estimation of polar cap potential difference from diurnal variation of SC amplitude

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[1] none

If we assume a dominant DL-field (the SC disturbance field produced mainly by the magnetopause current) for geomagnetic sudden commencements(SCs) observed in low and middle latitudes, we might expect that the SC amplitude takes the maximum values around noon. Contrary to this expectation, the diurnal variation of the averaged SC amplitude at Kanoya (geomag. lat.= 21.7 deg), Kakioka(27.2), Memambetsu (35.2) takes the maximum near midnight, the second maximum around noon and the minimum in the morning (near 8h LT). We consider that this is caused by the region-1 type field aligned current (FAC) responsible for the DP-field (the SC disturbance field of polar origin) of the main impulse of SC (DPmi) [Araki et al., 2006]. The ground H-component due to this FAC, DPmi(FAC), becomes negative in daytime and positive in nighttime. We can calculate the diurnal variation due to the FAC by giving the FAC intensity and ionospheric conductivities [Osada, 1992, Kikuchi et al., 2001], and the FAC intensity or polar cap potential may be estimated by comparing the diurnal variation from the observations and calculation. Since we have found that the size of the observed diurnal variation depends upon the IMF-Bz, it will be possible to deduce the IMF-Bz from the observed diurnal variation. Also we will be able to evaluate the DL-field by subtracting the DPmi-field from observed amplitude of SCs (DL= Dsc - DPmi).