IMF dependence of LT variation of SC amplitude.

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[1] NOTHING

The SC (geomagnetic Sudden Commencement) is caused by sudden enhancement of the magnetopause current due to sudden increase of the solar wind dynamic pressure. Since the current flows mainly in the day side magnetopause, the SC amplitude is to be larger in day side than in night side.

Actually the SC amplitude at geosynchronus orbit (R = 6.6 Re) shows a LT variation with the peak around noon and almost zero amplitude around mid-night[Kokubun; 1883].

Amplitude of SCs observed on the ground is expected to show a similar LT variation, although the size of the LT variation will be smaller than that at the geosynchronus orbit. Note that day-night difference in distance from the sub-solar point of the magnetopause is only 2 Re on the ground while it is 13.6 Re at the geosynchronus orbit.

We have checked LT variations of all SCs observed in 43 years from 1957 to 2000 and found that the averaged amplitude is larger in day time at Alibag (geomag. lat. = 10 deg.) but it is larger in night time at Kanoya (21.7 deg.), Kakioka (27.3 deg.) and Memambetsu (35.2 deg.).

At present we consider two mechanisms to interpret this unexpected LT variation of SCs.

(1) day side decrease in the H-component due to a Region-1 type field aligned current (FAC) which is produced during SCs
(2) night side increase in the H-component due to the wedge current system associated with SC triggerd substorms.

The FAC of (1) is always produced during SCs but the current system of (2) appears only when the IMF-Bz is southward.

Russell et al.(1992, 1993) showed that amplitude of several SCs becomes larger in night time when IMF-Bz is southward. Keika et al.(2002) confirmed that 3 large amplitude SCs are enhanced in night time.

Based upon the results mentioned above we study if the LT variation of the SC amplitude depends upon the IMF-Bz by using large amount of data.