

Detection of SC above and below the ionosphere — effects of induced electric current

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Although the primary source current of the geomagnetic sudden commencement(SC) is the magnetopause current(MC), the ring current(RC), field-aligned currents(FAC), ionospheric currents(IC), and tail currents (TC) are also simultaneously changed during SCs. It is necessary to know separately roles of each current for better understanding of response of the magnetosphere-ionosphere-earth system to sudden increase of the solar wind dynamic pressure. Among them it is especially important to detect the ionospheric currents which produce complex distribution of amplitude and waveform of SCs.

In the SGEPS Fall Meeting 2007 we reported the following results of the analysis of SC data obtained by Oersted (launched in February, 1999 to altitude 640-850km.) and CHAMP (July 2000, 450-500km). (1) no significant ionospheric current flows in the nighttime ionosphere, (2) in the day time both PI(preliminary impulse) and MI(main impulse) show out-of- phase variations at the satellite (Oersted) and on the ground, suggesting significant ionospheric currents. (3) a in-phase PI is observed at CHAMP and on the ground in the dayside middle latitude(11h LT, 30 geomag. lat.).

In this talk we consider effects of secondary induced currents to equatorial SCs. We assume MC and polar originating IC as the source current. The MC induces secondary current in the ionosphere and the earth and the polar originating IC induces it in the earth.