

SC related plasma wave and field phenomena inside the plasmasphere

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In order to clarify the plasma wave phenomena and DC electric and magnetic field disturbances associated with SC's inside the plasmasphere, we analyzed data of plasma wave, DC electric and magnetic fields obtained by the Akebono satellite within a period from March 1989 to January 2002. Data sets of 101 SC events observed inside the plasmasphere indicate clear intensification and frequency shift of electromagnetic LHR and whistler mode waves. Especially, in the magnetic equator region of the plasmasphere there can be seen modification of electromagnetic or electrostatic proton, helium and oxygen cyclotron waves. Together with these SC triggered plasma wave phenomena, the DC electric and magnetic field disturbances were analyzed. The initial excursion of the DC electric fields of 39 SC events has the amplitude of about 1 to 30 mV/m directed to westward direction inside the plasmasphere followed by dumping oscillation of Pc3-4 ULF waves with a period from 40 seconds to 60 seconds in all geomagnetic local times. The ULF waves have continued for about 3 to 6 minutes after the SC onset with a damping signature. The amplitude of the initial electric field perturbations also tends to be larger in the dayside plasmasphere regions than those in the nightside regions. The electric field perturbations of the E_y component also show clear increase with a value from 0.5 to 2 [mV/m] about 1 to 2 minutes after the passage of the compressional wavefront. This result suggests that the dawn-to-dusk convection electric field enhanced by the magnetospheric compression penetrates inside the plasmasphere. On the other hand, the Poynting vector is directed earthward with the amplitude of 0.000041-0.000156 [W/m²]. This analysis indicates that a compressional wave associated with SC propagates inside the plasmasphere.