

Statistic Results of the Energetic Particles and Earthward High Speed Flows in the Plasma Sheet

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Based on the measurements made by the Cluster II when the spacecraft transverse the earth plasma sheet, we have carried out a statistic study of the distribution of energetic particles in this region. It is found that The dependence of ion energy density on different geomagnetic activity indicating by Kp indices has been studied. A linear correlation of energy density with Kp indices has been found. The profiles of different ion energy density distributions of Z with low Kp and high Kp are represented, respectively. All the earthward high speed flows during 2001 and 2002 have been categorized into two groups according to their perpendicular speeds (greater or lower than 300 km/s). It is found that the variations of ion number density, temperature and plasma beta value versus the transverse speed all show the same trend for the two groups of events. However, observations show that the abundance of energetic oxygen ions and the ratio of oxygen ions to protons are different for the two groups of events. Compared with the averaged energetic ion observation results during geomagnetic active and quiet times, it is inferred from the observation that the two groups of events might originate at different place in the earth plasma sheet and keep the energetic particle information while they were travelling towards the Earth. The high-speed flow with higher transverse velocity seems to be generated in the near earth region and therefore has higher abundance of heavy ions, while the flows mainly along the magnetic field direction might be generated in the distant plasma sheet and thus most likely could be observed in the plasma sheet boundary region.

Keywords: Energetic Particles; High Speed Flow; Plasma Sheet.