

Flux Enhancement of Energetic Particles in the Near-Earth Region: GEOTAIL-HEP Observation

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Flux enhancements of energetic (>80 keV) particles in the Earth's magnetosphere were studied using the energetic particle data obtained by the HEP-LD instrument onboard the GEOTAIL spacecraft. We visually inspected the HEP data during Apr., 1996 – May, 1998 and identified 206 dispersed events and 63 dispersionless events. It was found that the dispersed events are distributed over all local time sectors in the near-Earth plasma sheet ($9 \text{ Re} < R < 15 \text{ Re}$), while the dispersionless events are found only on the nightside. We also investigated the correlation of flux enhancements with substorm activities and found that both of the dispersionless and dispersed events are closely associated with substorm activities.

Flux enhancements of energetic (>80 keV) particles in the Earth's magnetosphere were studied using the energetic particle data obtained by the HEP-LD instrument onboard the GEOTAIL spacecraft. In the magnetosphere, GEOTAIL often observes flux enhancements of energetic particles with clear energy-dispersions and those without any dispersion (simultaneous flux enhancements with different energies). We visually inspected the HEP data during Apr., 1996 – May, 1998 and identified 206 dispersed events and 63 dispersionless events. We analyzed spatial distributions of those events in the magnetosphere. It was found that the dispersed events are distributed over all local time sectors in the near-Earth plasma sheet ($9 \text{ Re} < R < 15 \text{ Re}$), while the dispersionless events are found only on the nightside. The occurrence frequency of the dispersionless events has a peak around local midnight and decreases rapidly away from the midnight to both dawn and dusk, while the dispersed events are of frequent occurrence on the dawn and dusk flanks. This result indicates that energetic particles forming those characteristic flux enhancements are generated around the local midnight sector and then drift from midnight to the dawn and dusk flanks. We also investigated the correlation of flux enhancements with substorm activities and found that both of the dispersionless and dispersed events are closely associated with substorm activities. Using Pi2 pulsation activities recorded on ground stations, we identified onset times of substorm activities corresponding to the dispersionless events and examined their temporal correlation in detail. The result is that the dispersionless events during which the spacecraft was inside the plasma sheet throughout are occurred within ± 2 minutes of the substorm onsets. Therefore the energetic particles constituting the flux enhancements are generated in the near-Earth plasma sheet at a substorm onset.