Geophysical Research Abstracts, Vol. 8, 10346, 2006
SRef-ID: 1607-7962/gra/EGU06-A-10346

0.0.1 Effects of a Time-Dependent Southward Magnetic Field Component on the Mirror Point Altitudes of Trapped Radiation Belt and Ring Current Electrons and Ions

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When a southward magnetic field component is superimposed on the geomagnetic dipole, the altitude of the mirror points of all trapped particles is raised. The trapped particles pile up at higher altitudes above the atmosphere. Conversely, when the southward component of the geomagnetic field decreases with time the mirror points of the trapped protons and electrons are dumped into the atmosphere, and their energy is enhanced by betatron effect. As a matter of consequence, when dB_z/dt happens to become negative (as for instance during the recovery phase of a geomagnetic storm or during micropulsations) the flux of precipitated particles at a given altitude is expected to be enhanced.
The time dependent electric field induced by the variable Ring Current magnetic field component has been determined. The resulting time dependent ULF electromagnetic field has been implemented to calculate the motion and betatron acceleration of the trapped particles, as well as their cross-L drift.
We speculate that sporadic bursts of relativistic electrons like those observed in the radiation belts as well as at their low altitude borders, must be generated at occasion of peak (positive) values of dB_z/dt. Such sporadic spikes inducing large (sometimes patchy) induced electric fields are expected to occur during the recovery phase of geomagnetic storms, as well as in distant diamagnetic plasma clouds that are injected into the outer regions of the magnetosphere, and that are traversed by the particles observed at the occasion of bursts of precipitated relativistic electrons. Experimental tests to verify these theoretical predictions will be presented.