



專題演講

Pitch angle distributions of electrons at dipolarization sites during geomagnetic activity: THEMIS observations

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Place : 健雄館(科四館) S4-917 教室

摘要/Abstract :

Changes in pitch angle distributions of electrons with energies from a few eV to 1 MeV at dipolarization sites in Earth's magnetotail are investigated statistically to determine the extent to which adiabatic acceleration may contribute to these changes. Forty-two dipolarization events from 2008 and 2009 observed by Time History of Events and Macroscale Interactions during Substorms probes covering the inner plasma sheet from $8 R_E$ to $12 R_E$ during geomagnetic activity identified by the AL index are analyzed. The number of observed events with cigar-type distributions (peaks at 0° and 180°) decreases sharply below 1 keV after dipolarization because in many of these events, electron distributions became more isotropized. From above 1 keV to a few tens of keV, however, the observed number of cigar-type events increases after dipolarization and the number of isotropic events decreases. These changes can be related to the ineffectiveness of Fermi acceleration below 1 keV (at those energies, dipolarization time becomes comparable to electron bounce time). Model-calculated pitch angle distributions after dipolarization with the effect of betatron and Fermi acceleration tested indicate that these adiabatic acceleration mechanisms can explain the observed patterns of event number changes over a large range of energies for cigar events and isotropic events. Other factors still need to be considered to assess the observed increase in cigar events around 2 keV. Indeed, preferential directional increase/loss of electron fluxes, which may contribute to the formation of cigar events, was observed. Nonadiabatic processes to accelerate electrons in a parallel direction may also be important for future study.

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