

Periodic enhancements of magnetic field, energetic particle fluxes, and high-frequency waves deep in the inner magnetosphere during substorm dipolarization: ERG observations

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Dipolarization is one of the important processes in the magnetosphere for understanding of substorm onset and development. Using ERG (Arase) spacecraft data, we studied periodic enhancements of magnetic field, energetic particle fluxes, and high-frequency waves deep in the inner magnetosphere during substorm dipolarization. The magnetic field oscillated at a period of 1 to 2 min during dipolarization. When it enhanced, both energetic ion and electron fluxes with a few tens to hundred keV were enhanced, accompanied by broadband electromagnetic waves and high-frequency electrostatic waves from below to above the electron cyclotron frequency. The electrostatic waves were seen in the inner plasma sheet, while they were weak or were not seen away from the inner plasma sheet. We will discuss the role of the periodic enhancements of particles and waves in dipolarization and substorm development.

Keywords: substorm, inner magnetosphere, dipolarization, ERG, Arase