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STUDY ON THE ACCELERATIONS OF ENERGETIC PARTICLES IN THE EARTH'S RADIATION
BELT

Abstract

The dynamics of energetic particles, usually ions and electrons with energy from around 1 keV to several MeV, are concerned as a part of space weather in the Earth's radiation belt, since they can harm both spacecrafts and astronauts. Understanding the acceleration mechanism of these energetic particles has technical significance in terms of promote the radiation belt electron and proton models, which can elevate the system design of HEO satellites to against the hazard due to space environment. The ultra low frequency (ULF) waves play important roles in the acceleration of energetic particles in the radiation belt. Taking advantage of multi-point observations by CLUSTER satellites, we investigate the interactions between ULF waves and energetic particles (electrons 20-400keV; ions 1-40 keV). The main results are summarized below: (1) The drift resonance of electrons and drift-bounce resonance of ions with the same ULF wave can occur simultaneously. Moreover, the electrons are remarkably accelerated due to the drift resonance. (2) The drift-bounce resonances of oxygen ions with ULF waves can be excited during storm times, leading the acceleration/deceleration of oxygen ions at the energy bands that satisfying the resonance condition. This study shows that the ULF waves can accelerate both the electrons and ions in the radiation belt significantly.