Interactions of energetic electrons with low-m number ULF waves in the inner magnetosphere during a storm recovery phase

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A number of previous studies have suggested that ULF waves, which occur during a recovery phase of a geomagnetic storm, are associated with the enhancement of electron flux in the outer radiation belt. ULF waves accelerate electrons whose drift velocities match the azimuthal phase velocities of ULF waves via drift resonance. Elkington et al., (1999 and 2003) proposed a simple model for the drift resonance effect on energetic electrons due to ULF toroidal and poloidal modes with large azimuthal wavelengths (low m numbers). Although some observational studies (Tan et al.,2004 and 2011) reported effects of low-m number ULF waves on electron acceleration, the interaction between low-m number ULF waves and energetic electrons is still incompletely understood.
In this study, we investigate interaction between low-m number ULF and energetic electron observed in the inner magnetosphere, using data from the multiple satellites, GOES 13, 15 and Van Allen probes. A Pc5 pulsation occurring at 6:00-8:00 UT on 13 September 2014 during a storm recovery phase are focused on. These Pc5 pulsations are dominated by the toroidal component with the frequency of a 3 mHz and a large amplitude of 30 nT when Van Allen Probes were located on the morning side (MLT~5) at L~6. Estimating m number from the phase difference of Pc5 pulsations and azimuthal separation between Van Allen Probes A and B, the Pc5 has an m number of 3 with westward propagation. Perturbations corresponding to the Pc5 pulsation are observed in the electron flux data. In this presentation, we discuss weather Pc5 pulsations accelerate the energetic electron via the drift resonant interaction.

