Quasiperiodic modulations of energetic electron fluxes in the ULF range observed by the ERG and RBSP satellites.

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One widely accepted scenario for the dynamic process of the radiation belt is that ULF oscillations in the Pc5 frequency band drive radial transport. When the electron drift period matches the wave period ULF waves cause violation of the third adiabatic invariant with the first and second invariants conserved. Radiation Belt Storm Probes (RBSP) observations show the evidence for drift-resonant interaction between energetic electron and ULF waves in the inner magnetosphere [Claudepierre et al., 2013, Hao et al.,2014].
Spatial variations of energetic electrons affected by ULF waves via drift resonance in the inner magnetosphere have not been reported. To understand spatial properties of energetic electron flux modulations, we compare energetic electron flux modulations observed by RBSP and Exploration of energization and Radiation in Geospace (ERG) satellites separated in longitude.
Modulations of energetic electron flux over an energy range from 500keV to 2.5 MeV with the frequency of ~ 4 mHz, starting around 6:30 UT on 30 March 2017, were simultaneously observed in the dawn and dusk sectors by the Extremely high-energy electron sensor (XEP) and the Magnetic Electron Ion Spectrometer (MagEIS) aboard ERG and RBSP, respectively. Both of the electron flux modulations observed by RBSP and ERG had an energy dispersion signature. ULF waves in the magnetic field with the same period as that of the flux modulations were not detected by the Magnetic Field Experiment (MGF) aboard ERG, while Pc5 pulsations in the compressional component observed by the Electric and Magnetic Field Instrument and Integrated Science (EMFISIS) of RBSP-B have the same period as the flux modulations.
Assuming that the electron flux modulations are generated at the same location and timing and drifted from RBSP to ERG positions, we estimated the source regions from the dispersion signature of the energetic electron flux observed by RBSP and ERG. The estimated source regions of the flux modulations are located at MLT ~14 and ~18 h. In the dusk-noon sectors, impulsive incoherent magnetic fluctuations with a large amplitude of ~40 nT with the frequency of ~4 mHz appeared in magnetometer data obtained on the ground. From these results, we conclude that incoherent fluctuations generate electron modulations in the noon-dusk sector and the modulation structures, which were observed by RBSP-B and ERG in dusk and dawn side respectively, drift eastward.

Keywords: ULF, energetic electron

