複数衛星を用いた内部磁気圏で観測される low-m ULF 波の経度方向の広がり

寺本 万里子 [1]; 坂口 歌織 [2]; 藤本 晶子 [3]; 能勢 正仁 [4]; 三好 由純 [5]; Singer Howard J.[6]; Kletzing Craig A.[7]; 松岡 彩子 [8]
[1] JAXA, 宇宙研; [2] 情報通信研究機構; [3] 九大・ICSWSE; [4] 京大・理 地磁気センター; [5] 名大 STE 研; [6] NOAA/SWPC; [7] Department of Physics and Astronomy, UoI; [8] JAXA 宇宙研

Azimuthal extent of low-m ULF waves in the inner magnetosphere observed by multiple satellites

Mariko Teramoto[1]; Kaori Sakaguchi[2]; Akiko Fujimoto[3]; Masahito Nose[4]; Yoshizumi Miyoshi[5]; Howard J. Singer[6]; Craig A. Kletzing[7]; Ayako Matsuoka[8]
[1] JAXA, ISAS; [2] NICT; [3] ICSWSE, Kyushu Univ.; [4] DACGSM, Kyoto Univ.; [5] STEL, Nagoya Univ.; [6] NOAA/SWPC; [7] Department of Physics and Astronomy, UoI; [8] ISAS/JAXA

The azimuthal wavenumbers of Ultra Low Frequency (ULF) waves in the Pc3-5 frequency band (2-100 mHz), which can provide information about the azimuthal scale and propagation direction of a wave, are useful diagnostics of the waves generation mechanism. Low-m (m <10) waves are predominantly toroidal modes resulting from field-line resonances generated by an incoming fast mode arriving from the outer boundary of the magnetosphere. Several statistical studies, which present the distribution of ULF waves in the inner magnetosphere, have been performed using measurements from satellite [Zhu and Kivelson 1991; Anderson et al., 1990; Lessard 1999]. Using the magnetic field data from the CRRES satellite, Hudson et al. [2004] found that there is a comparable probability of occurrence of toroidal mode oscillations on the dawn and dusk sides of the magnetosphere inside geosynchronous orbit. Although previous studies have presented the spatial distributions of ULF power and occurrence in the inner magnetosphere, the spatial features of azimuthal wavelength in the inner magnetosphere are still incompletely understood.

We investigate the azimuthal extent of low-m ULF waves observed in the inner magnetosphere, using magnetic field data from the multiple satellites, including GOES 13, 15 and Van Allen Probes. We focus on a Pc5 pulsation occurring at 6:00-8:00 UT on 13 September 2014 during a storm recovery phase. These Pc5 pulsations are dominated by a 3 mHz toroidal component and large amplitude of 30 nT when the Van Allen Probes were located in 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, we find m =3 with westward propagation. These oscillations are not observed in the premidnight sector at L˜6.6 by the GOES 15 satellite while GOES 13 observes 3 mHz Pc5 pulsations in the postmidnight sector. These results indicate that these low-m Pc5 pulsations are not global in azimuth while the m numbers indicate that the azimuthal wavelength of ULF waves is large. In this presentation, we will show several events and discuss the generation mechanisms of ULF waves occurring in the inner magnetosphere with various m numbers.