

Van Allen Probes 衛星データを用いた、ULF 波動分布と経度方向波数についての解析

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ULF wave distribution and azimuthal wave number observed by Van Allen Probes

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Ultra low frequency (ULF) waves in the magnetosphere are generated by various processes. Understanding their distribution in the inner magnetosphere is important to estimate their energy source and generation processes. In this study, we investigate the spatial distribution of ULF wave occurrence at $L=3-7$, for toroidal, poloidal, and compressional modes, in Pc3-5 frequency ranges using magnetic field data obtained by Van Allen Probes from October 2012 to July 2014. We find that azimuthal Pc5 waves are frequently observed on the dayside, in particular on the morning side. Poloidal Pc4-5 waves appear on the dayside and in the pre-midnight region.

Azimuthal wave number of ULF waves is an important parameter. Most of the previous studies estimated the azimuthal wave number by using ground magnetometers or HF radars. Since the observation of azimuthal wave number in space needs multiple satellites, there are only a few studies that estimated the azimuthal wave number. Van Allen Probes consist of two spacecraft, and we can calculate the azimuthal wave number from a phase difference of ULF waves observed by these probes. We choose events in which the azimuthal and radial separation between satellites are within 2.5 degrees and 0.1 R_e , respectively. We find about 30 events in which satellites satisfy the above criteria and simultaneously observe ULF waves. One of the events shows the azimuthal wave number of about -190 in pre-midnight at $L\sim 5.8$.

In the presentation, we will discuss the results in detail in comparison with past studies.