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カusp周辺の広帯域 (BBELF) 波動の統計解析

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Statistical study on broad band ELF waves in and near the cusp

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The ionosphere is an important source of magnetospheric plasma, especially for heavy ions with low charge states. The region near the cusp is one of the most important regions for ion outflows. Although ion acceleration perpendicular to the magnetic field by broadband ELF waves is thought to be important for driving ion outflows near the cusp, even the intensity of the waves is not well understood. We statistically investigate the energy input to the ionosphere and the ELF waves using data obtained by the Fast Auroral SnapshoT (FAST) satellite. The precipitating electron number density and Alfvén Poynting flux in and near the cusp (0900 – 1500 MLT) exhibit a relatively good correlation with a broadband ELF wave intensity at ~10 Hz, which is close to the local O⁺ cyclotron frequency at ~4000 km altitude. The correlation coefficients tend to be higher in summer or equinox than those in winter, while occurrence of very large intensity waves is apparently large in winter. Because the background plasma density is expected to be small in winter, the background plasma condition may also affect the wave intensity in addition to the energy input to the ionosphere. The power law index of the electric field wave spectra between 10 and 200 Hz are - 0.5 and - 2.5 in most of cases, when the wave intensity was sufficiently larger than the noise level and fast survey data with a sampling frequency equal to or better than 512 Hz are available.