

Mechanism of multiple electron energy-time dispersions observed in the vicinity of the inverted-V electron acceleration region

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We have analyzed the data obtained by high-time resolution Electron and Ion energy Spectrum Analyzer (ESA/ISA) onboard SS-520-2 sounding rocket. We especially have discussed Multiple Electron Energy-time Dispersions (MEEDs) (frequency 1-2Hz, field-aligned precipitation) observed by ESA when the rocket flew high latitude side of cusp region or mantle region at about 600 km altitude [Tanaka et al, 2001 SGEPPS]. Our previous study estimated that electrons were accelerated along the magnetic field at about 5000km altitude. It is well known that inertial Alfvén waves or electromagnetic ion cyclotron (EMIC) waves which maintain parallel electric field in the region where wave phase velocity is larger than local electron thermal velocity can accelerate electrons parallel to the magnetic field [C.A. Kletzing and S. Hu, GRL, 2001]. We have applied this model to our observation, and obtained the reasonable result about the time-scale and energy range of the electron dispersion [Tanaka et al, 2th Space Science Symposium, 2001]. The periodicity of electron dispersion is explained by a simulation including reflection of Alfvén wave between ionosphere and the region at an altitude few thousands km altitude where Alfvén waves velocity changes drastically.

Electron energy-time dispersion or Field-aligned bursts (FABs) have been reported to be observed at the edge of inverted-Vs or with in inverted-Vs [Joshua, JGR, 2001 therein]. It is natural to relate the generation mechanism of MEEDs or FABs to the inverted-V type electron acceleration. However, the detail relation between MEEDs or FABs and inverted-V type electron acceleration is not clear. Our experiment also has revealed that MEEDs observed in the vicinity of the inverted-V type electron acceleration region. Besides, using both our electron and ion data, we have found that inverted-V type electron acceleration has time variation [Ishii et al, in 2001 SGEPPS fall meeting]. Electron pitch angle dispersion observed by ESA at the edge of the inverted-V structure is another evidence of this time variation. We tried to make a new model that has close connection between time variation of inverted-V type electron acceleration and the generation of the MEEDs or FABs.