

Small-scale field-aligned electron acceleration by inertial Alfvén waves

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Multiple electron energy-time dispersions (MEEDs) were observed at altitude of several hundred km in the high-latitude part of the dayside cusp region by a sounding rocket, which was launched on December 2000 from Ny-Alesund. The MEEDs were characterized by field-aligned precipitation with falling energies from 200 eV down to 20 eV at a repetition rate of 1-2 Hz. Their time-of-flight analysis resulted in that the source region distributes along to the geomagnetic field in several thousand km altitudes and the higher energy electrons are accelerated at the higher altitudes. With test particle simulations, these characteristics of the MEEDs can be quantitatively interpreted in terms of the resonance acceleration of electrons (magnetosheath origin) with field-aligned electric fields generated by large amplitude inertial Alfvén waves. The Alfvén waves might originate at the dayside magnetopause, associated with magnetic reconnection.