R006-24
A 会場 ：11/7　AM1 （9:00-10:30）
09:30〜09:45

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Generation of the Electron Zebra Stripes in the Earth's Inner Magnetosphere

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Energy versus L-value spectra of the electrons with 10's-100's of keV energies exhibit a banded structure that resembles the zebra-like patterns. Hence, they have been named as "zebra stripes". Zebra stripes are the unique feature observed in the Earth's inner magnetosphere where the electron flux intensities exhibit sharp repeated peaks and valleys in energy. In the present studies, we analysed the spatio-temporal growth of the electron zebra stripes that appeared during the intense geomagnetic storm of September 8, 2017. We employed an advection simulation for electrons, under the time-dependent electric and magnetic fields provided by a global magnetohydrodynamics (MHD) simulation, and found that electron zebra stripes were generated. To understand the evolutionary characteristics of the electrons comprising of the peaks and the valleys, we back-traced the bounce-averaged electron trajectories. Significant influence of the ionospheric electric fields were identified on the electron motion in the radial direction. The enhancement of the westward electric field in the premidnight to postdawn region transports the electrons earthward, triggering the formation of the peaks. The electrons comprising of the valleys have not experienced such earthward transport. The generation of the westward electric field has its roots in the Region 1 field aligned current (FAC) in the polar ionosphere. The electric field penetrates deep into the lower latitudes, and propagates into the inner magnetosphere. In addition, the non-uniform ionospheric conductivity at the equatorward edge of the auroral oval distorts the electrical potential patterns, and extend the westward electric field region to the dawn. Our study highlights the coupling of the solar wind and the deep inner magnetosphere for the formation of electron zebra stripes.