[EE] Evening Poster | P (Space and Planetary Sciences) | P-EM Solar-Terrestrial Sciences, Space Electromagnetism & Space Environment

[P-EM15]Dynamics in magnetosphere and ionosphere

convener:Yoshimasa Tanaka(National Institute of Polar Research), Tomoaki Hori(Institute for Space-Earth Environmental Research, Nagoya University), Aoi Nakamizo(情報通信研究機構　電磁波研究所, 共同), Mitsunori Ozaki(Faculty of Electrical and Computer Engineering, Institute of Science and Engineering, Kanazawa University)

Mon. May 21, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

This session provides an opportunity to present recent results from satellite and ground-based observations and theoretical and simulation studies on the magnetosphere, ionosphere, and their coupling system. We invite contributions dealing with various phenomena related to the magnetosphere-ionosphere system: solar wind-magnetosphere interaction, magnetosphere-ionosphere convection, field-aligned current, magnetic storms/substorms, neutral-plasma interaction, ionospheric ion inflow and outflow, aurora phenomena, and so forth. Discussions on planetary and satellite ionosphere and magnetospheres, future missions and instrument developments are also welcome.

[PEM15-P22]Evolution of equivalent current patterns in auroral zone ionosphere during substorms

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Keywords:substorms, ionospheric equivalent currents, Convection surge

Evolution of the ionospheric equivalent current patterns in auroral zone was examined during substorms using ground magnetometer network data. Results obtained are as follows; (1) Preceding the substorm onset by 20 min, ionospheric convection was initiated in the auroral zone consistent with polar cap convection directing to the equatorward latitudes. At the conjugate geosynchronous orbit, increase of thermal ion flux directing towards the equatorial plane (inflow) was observed. (2) At substorm onset, ionospheric convections were enhanced in a narrow longitudinal sector in association with the convection surge at geosynchronous orbit. (3) Following the substorm onset, vortical structure of the equivalent currents (or convections) expanded eastward as well as poleward directions from the onset longitudes in the midnight sector. The size of the vortex increased, in one hour after the onset, to cover 50N to 70N and 220E to 340E in geomagnetic latitudes and longitudes, respectively. (4) The vortical currents (convections) were left in the auroral zone ionosphere after the ionospheric convection subsided.

We propose a new substorm scenario in that substorms were initiated in the auroral zone ionosphere by the transmission of enhanced convection electric fields from the magnetosphere. Convection electric fields penetrated into auroral zone ionosphere develop vortical flows in pre-existing ionospheric convections. The vortical flow increased its scale size in latitudes and in longitudes after onset. The observations outlined above indicate development of the Harang Discontinuity.