Geophysical Research Abstracts
Vol. 14, EGU2012-2591, 2012
EGU General Assembly 2012

An unusual strolling motion of polar cap patches: an implication of the influence of tail reconnection on the nightside polar cap convection

K. Hosokawa (1,2), J. I. Moen (2), P. T. Jayachandran (3), K. Shiokawa (4), and Y. Otsuka (4)

(1) Department of Information and Communication Engineering, University of Electro-Communications, Tokyo, Japan (hosokawa@ice.uec.ac.jp), (2) Department of Physics, University of Oslo, Oslo, Norway, (3) Department of Physics, University of New Brunswick, Fredericton, Canada, (4) Solar-Terrestrial Environment Laboratory, Nagoya University, Nagoya, Japan

On January 12, 2005, a successive appearance of polar cap patches on the nightside was observed in the image captured by an all-sky imager (ASI) at Resolute Bay, Canada (74.73°N, 265.07°E). During the interval, the patches showed an unusual strolling motion in which their moving direction was very drastically changed twice (antisunward-dawnward-duskward). One may suspect that such changes in motion were caused by the reconfiguration of the polar cap convection due to a change in the IMF B_y. However, there were no remarkable variations in the sign of the IMF B_y in the solar wind data, which indicates that the unusual behavior of the patches was independent of the IMF-driven polar cap convection changes. Before the first change in the motion occurred, a transient bright aurora appeared in the equatorward part of the field-of-view in the dawn side. Immediately after the appearance of the transient auroral feature, the direction of the motion of the patches changed from anti-sunward to dawnward as if the patches were drawn into the aurora. After the disappearance of the aurora, the patches once almost stagnated but subsequently started to move duskward and anti-sunward. We interpret the bright auroral feature as a signature of the poleward boundary intensification (PBI), which is an ionospheric manifestation of an enhanced reconnection in the magnetotail. Accordingly, we speculate that an excited flow across the open-closed field line boundary redirected the anti-sunward polar cap convection towards the PBI and then allowed the patches to be drawn into the aurora near the polar cap boundary. This study indicates the importance of the tail reconnection as a driver of the nightside polar cap convection, resulting in the dynamical characteristics of polar cap patches; this relation may enable us to monitor the activity of the tail reconnection by using the motion of polar cap patches as an indicator.