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Auroral surge at poleward edge in the first 10 min intervals of Pi2 onset

Osuke Saka[1*], Kanji Hayashi[2]

[1]Office Geophysik, [2]University of Tokyo

We reported that Pi2 pulsations often observed on the ground and at the geosynchronous altitudes are mostly attributable to the bifurcation of the fast earthward flows. The flows are repeated at Pi2 periodicities and propagated either eastward or westward after the bifurcation (Saka et al., JASTP, 2010). At the same time, the auroral surge associated with the Pi2 was observed at the poleward edge (SGEPSS at Okinawa, 2010).

For auroral events taken at Manitoba, Canada in 24 and 27 Jan 1986, we made the following observations:
(1) The surge propagated either westward or eastward at poleward edge.
(2) The wave polarizations at geosynchronous altitudes were CW / CCW for westward / eastward surge, respectively.
(3) At the equatorward part of the surge, vortex structures though to be caused by the plasma flows at poleward edge were observed.

Based upon these observations, we conclude that:
(1) The surge is the Alfvenic aurora activated by the eastward/westward propagating burst of flows that repeated at the Pi2 periodicities.

Keywords: Pi2 pulsation, substorm, Alfvenic aurora, all-sky image, geosynchronous altitudes