

Substorm onset and pseudo breakup

Akira Morioka[1]; Yoshizumi Miyoshi[2]; Hiroaki Misawa[3]; Fuminori Tsuchiya[4]; Akira Kadokura[5]; Hiroshi Matsumoto[6]; Kozo Hashimoto[7]; Kiyohumi Yumoto[8]

[1] Planet. Plasma Atmos. Res. Cent., Tohoku Univ.; [2] STEL, Nagoya Univ.; [3] Planet. Plasma Atmos. Res. Cent., Tohoku Univ.

; [4] Planet. Plasma Atmos. Res. Cent., Tohoku Univ.; [5] NIPR; [6] Kyoto Univ.; [7] RISH, Kyoto Univ.; [8] Earth and Planetary Sci., Kyushu Univ.

The onset process of auroral substorms in connection with the vertical evolution of auroral particle acceleration is studied on the basis of auroral kilometric radiation (AKR) dynamics. We show that the auroral acceleration process at substorm onset basically consists of two stages: (1) appearance/intensification of a low-altitude acceleration region at 4000-5000 km accompanied by initial brightening and (2) breakout of high-altitude field-aligned acceleration above the pre-existing low-altitude acceleration region at 6000-12,000 km, which is followed by auroral breakup and poleward expansion. It is also noted that the precursor-like phase before auroral breakup (between initial brightening and breakup) may correspond to pseudo breakup. That is, pseudo breakup may be the case when enhanced low-altitude acceleration (=initial brightening) is not followed by high-altitude acceleration (=auroral breakup and poleward expansion). If that is the case, the buildup of high-altitude acceleration divides substorms between substorm onset and pseudo breakup.