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Does a "substorm precursor" exist in the polar cap?

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An isolated auroral substorm, which occurs without external triggering, can develop as a result of inner instabilities in the geomagnetic tail. The comparative analysis of presubstorm variations of the geomagnetic field and particle flux in the geomagnetic tail along with geomagnetic and auroral disturbances in the polar caps is of key importance for the discrimination between direct triggering and intra-magnetospheric processes in a substorm onset. In the present study we compare the auroral disturbances and geomagnetic pulsations in the frequency range 1-5 mHz (Pc5/Pi3) at nighttime high latitudes during both quiet geomagnetic intervals preceding isolated substorms and non-substorm intervals. Superposed epoch analysis is applied to reveal pre-substorm variations ("substorm precursors"). The data from IMAGE magnetometer network, the Meridian Scanning photometer (Svalbard), and particle flux measured by GEOTAIL, has been used. The effect of presubstorm activation (Yagova, 2000) is reproduced during the solar minimum conditions.

References

Yagova N., V. Pilipenko, A. Rodger, V. Papitashvili, J. Watermann, Long period ULF activity at the polar cap preceding substorm, in: Proc. 5th International Conference on Substorms, St. Peterburg, Russia (ESA SP-443), 603-606, 2000.