

Polarization jet formation during a substorm brake up phase: Results of ground-based measurements

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Observations of polarization jet phenomena on the ground-based ionospheric station in Yakutsk ($L = 3.0$) in 1989-1991 (110 events) are analyzed and compared with variations of the AE – index and local magnetic activity. It is shown that the development of polarization jet in the near midnight sector may occur during a substorm brake up phase in not more than 10 minutes. The polarization jet formation is then related to a specific variation in magnetic field corresponding by shape to fast passing of Harang discontinuity above the station. Results of statistical analysis of ground-based data on polarization jet phenomenon well correspond to those for spacecraft observations. It is revealed that the average time delay between the commencement of a substorm with $AE \geq 500$ nT and the appearance of polarization jet at $L = 3.0$ is equal to 0.5 hour near midnight and to 1.0 – 1.5 in the dusk sector. It is shown that when energetic ions are injected to the region of Harang discontinuity above the ground based station, the time of polarization jet formation is likely to be ~ 10 minutes and in this case the Harang discontinuity can move westward that is in qualitative agreement with observations.