**Latitudinal distribution of nighttime auroral precipitation during magnetic calm and near the time of substorm onset**

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Observations from DMSP F7 spacecraft during 1986 in the pre-midnight MLT sector were used to determine latitudinal profiles of auroral precipitation during magnetic calm and in time intervals just before and after substorm onset. Special attention is paid to the study of the isotropy boundary (BI) position, which according to DMSP spacecraft is determined by the corrected geomagnetic latitude (CGL) of the maximum energy flux of the precipitating ions. The IB position determines the degree of tension of geomagnetic field lines in the magnetospheric tail. When the magnetic field lines extend into the tail, the isotropy boundary approaches the Earth. During magnetic calm (averaged AL=-12 nT, Dst=-2 nT, IMF Bz=+2.3 nT and the solar wind dynamic pressure Psw=2.5 nPa) the isotropy boundary was found at Φ' = 68.3 ± 0.5 CGL and the ion pressure was Pimax = 0.58 ± 0.08 nPa.

Magnetospheric substorm phases were determined by using 1-min data of IMF Bz, Psw, and AL-, SYM/H- and PC - indexes from OMNI Web. In the final stage of the growth phase (under average conditions: AL=-65 nT, IMF Bz=-1.4 nT, Psw=3.3 nPa) the IB was shifted equatorward to Φ' = 65.4 ± 0.7 CGL and the ion pressure increased up to Pimax = 1.09 ± 0.11 nPa. According to observations of the THEMIS spacecraft, the radial distribution of ion pressure in the equatorial plane of the magnetosphere was obtained under similar geomagnetic conditions described above. In an isotropic plasma, the ion pressure is constant along the magnetic field lines from the ionosphere to the equatorial plane. Then, at magnetic calm, the IB is projected into the equatorial plane at a distance of about 7-8 Re, while just before the substorm onset at a distance of ~4-5 Re.

Just after the substorm onset (averaged AL=-182 nT, IMF Bz=-0.7 nT, Psw=2.2 nPa) the IB was defined at approximately the same latitude as before that at Φ' = 65.5 ± 0.7 CGL but the ion pressure was decreased up to Pimax = 0.79 ± 0.08 nPa. Auroral electrons precipitate in the region of isotropic plasma poleward the IB, however, immediately after substorm onset the energy flux of the precipitating electrons has a largest and narrow maximum at the IB. The flux value corresponds to an auroral luminosity in the 557.7 nm emission of about 26 kR, indicating that the region of the auroral break-up coincides well with the location of the isotropy boundary.