

PENETRATION DYNAMICS OF THE RING CURRENT INTO THE PLASMASPHERE DURING SUBSTORMS BY THE OBSERVATION OF DIFFUSE AURORA AND SAR ARC

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Observations of the diffuse aurora (DA) and stable auroral red (SAR) arc are the informative investigation method of magnetosphere-ionosphere coupling in the vicinity of plasmapause and inner boundary of the plasma sheet during magnetospheric disturbances. SAR arcs are the consequence of interaction of the outer plasmasphere (plasmapause) with energetic ions of the ring current. The DA is caused by the low-energy electron precipitation from the plasma sheet. During substorms we observe the intensity increase of DA and its equatorward extension up to the plasmapause projection which is mapped by the SAR arc occurring at that time. (Ievenko et al, Adv. Space Res., 2008).

In this work we present the new study results of the DA and SAR arc dynamics based on spectrophotometric observations at the Yakutsk meridian (199° E geomagnetic longitude). For individual events the relationship of equatorward extension of the DA in the 557,7 nm emission to the magnetospheric convection intensification after the turn of IMF B_z to the south is shown. The longitudinal dynamics of SAR arc formation during the substorm expansion phase is investigated. The connection of SAR arc occurrence with the substorm injection by the geosynchronous measurements is analyzed. It is assumed that the interval of latitudes where SAR arcs are observed during weak and moderate storms is a statistical map of the outer plasmasphere region, into which the developing ring current penetrates and damps during substorms.

Plasma sheet, substorm injection, ring current, outer plasmasphere, SAR arc

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