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Arctic networks and auroral TV camera records made in Loparskaya observatory, Kola peninsula.

Energetic particle measurements on the Coronas-I and LANL geostationary satellites compared with ground-based observations allow to position the regions and boundaries of the particle acceleration and precipitation in different energy ranges.

INTRODUCTION

The problem of the magnetosphere extension of the auroral oval during substorms remains to be solved. There are several substorm models suggesting that substorm onset and subsequent activations are taking place on closed quasi-dipole magnetic field lines [Lui, 1991, Roux et al., 1991]. There are strong experimental evidences in support of this geometry. Active auroras during onset and expansion happen together with riometer absorption and X-ray bursts generated by the energetic electrons precipitating into the polar ionosphere [Winckler et al., 1958, Anderson and DeWitt, 1963]. The source of enhanced high energy particles and its location in the magnetosphere are well known: it is so called dispersionless injections [McIlwain 1974, Birn et al., 1996]. While some injections were registered as deep as the maximum of the outer radiation belt at 4.8 Re [Friedel et al., 1994], all others are co-located with outer radiation belt slope [Lazutin and Korth, 1998]. The position of the boundary of the trapping region as exposed by the dropout effect is located at 15-20Re in weak substorms and 7.5-10 Re

problems related to the substorms with especially large poleward extensions when active aurora propagates to the latitude which usually belong to the polar cap. Substorms with expansion from the usual auroral zone into high latitude "polar auroral zone" (PAZ) have been studied by Weatherwax et al., [1997] and Doolittle et al., [1998]. They show that the energy spectrum and intensity of accelerated/precipitated particles indicates that they do not differ from typical substorm injections registered at the quasitrapping region. At the same time all possible magnetic field models suggest that on PAZ

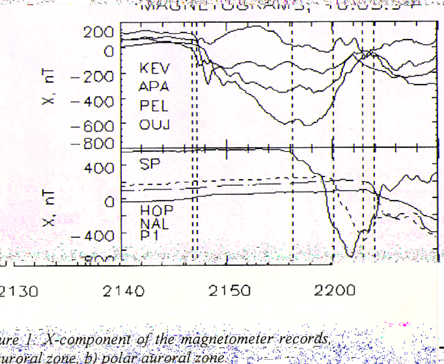

Figure 1. X-component of the magnetometer records, a) auroral zone, b) polar auroral zone.

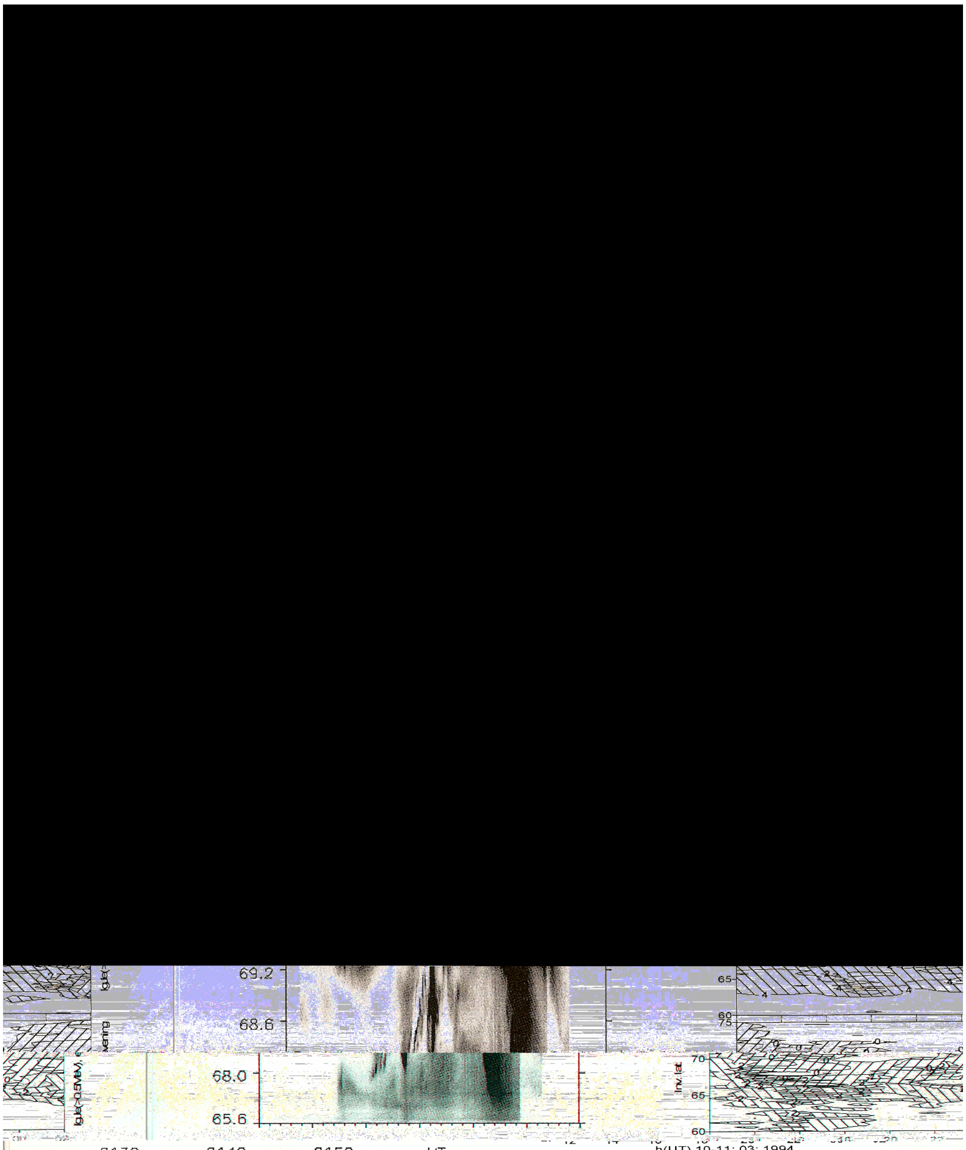

Figure 2: The keogram of the aurora created using TV camera record at the Loparskaya observatory

Figure 4: Latitudinal profiles of >0.5 MeV electrons, evening and morning sector, CORONAS-I orbits.

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dropout was observed both in protons and electrons. The flux decrease began at 2100 UT; this moment might be regarded as the beginning of the growth phase. The last 5-10 minutes before the substorm, onset flux decrease was especially fast which means that satellite moves outside the trapping region into the magnetotail (or lobes) [Sauvaud and Winckler, 1976, Dandouras et al., 1986]. AT 2135-2137 UT fast recovery from the

in Lovozero. At the morning sector a particle flux decrease was also observed from 2100 UT but dropout recovery was delayed until 2150-2157 UT which coincided with a second PAZ substorm intensification. In between, the configuration of the night-side magnetosphere remained asymmetrical with the trapping boundary closer to the Earth in the morning.

Coronas-I satellite for higher energy (Mev ra
electrons and ions which for higher energies was r
closer to the Earth.

Another important characteristic of this disturbance
extreme poleward expansion of the activity. The
activations of the expansion take place at the latitu
which usually belong to the polar cap region.

known class of the substorm activity described in several case studies, but there remain several questions, which is difficult to answer from traditional view on magnetosphere configuration.

Because the enhanced particle flux does not pass through the satellites located at or near the trapping

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spectra.

Geophys. Res. Letters, 24 (5), pp.579-582, March 1, 1997.

Winckler, J. R., L. Peterson, R. L. Arnoldy, R. A. Hoffman. X-rays from visible aurorae at Minneapolis, *Phys. Rev*., V. 110, p.1221, 1958.