Session 1

Auroral Dynamics, Irregularities and Pulsations and their Relations to the Magnetospheric Disturbances.

SIMULTANEOUS GROUND-BASED AND SATELLITE MEASUREMENTS IN THE REGION OF SAR-ARC.

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Results of the ground-based photometric measurements of latitudinal profiles of emission intensity 630.0 nm and electron temperature at satellite over the regions of subauroral stable red arcs appearance are given. Data on seven flights of the satellite near and on the meridian of st.Maimaga (63° N, 129° E) have been selected and compared with our measurements. The latitudinal profiles of emission intensity 630.0 nm correspond to the profiles T_e . Maximum T_e spatially coincide with maximum SAR-arc position. The temperature in the region of SAR-arc is increased from 2500 K (the background T_e) to ~5500 K.

PRESENCE OF STRONG LOCAL ELECTRIC FIELDS IN THE REGION OF SAR-ARC.

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By complex optical and ionospheric measurements at st. Yakutsk it has been established that when the SAR-arc arises for the interval < 15 min the local minimum of electron density in F-region is formed and the ionograms with typical signatures for the polarisation jet (SAID-condition) are observed. It is the evidence of presence of strong electric fields (E>100 mV/m) in ionosphere. In this case side by side with the other SAR-arc energy sources the effect of the ion frictional heating mechanism and luminescence excitation by powerful electric field are turned out to be important.

OPTICAL AND INTERFEROMETRIC MEASUREMENTS IN THE REGION OF SAR-ARC.

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The results of simultaneous photometric and interferometric measurements in the observation region of middle-latitudinal red arcs at st. Maimaga ($\varphi_c \sim 56.5$) near Yakutsk are presented. During the SAR-arc observation the increase of atmosphere neutral component Doppler temperature is registered both inside the arc and near the arc. The atmosphere temperature maximum are delayed from SAR-arc intensity maximum. The average delay time between maximum of intensity and temperature is about 1-2 hours. The atmosphere heating in SAR-arcs can be apparently explained by a joint action of the heat flow from magnetosphere and frictional interaction of neutral particles with ion of atmosphere whose movement is caused by electric field of magnetosphere origin.

ON TNE SELECTION OF COORDINATE SYSTEM FOR THE AURORAL OBSERVATIONS

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One of the main problem of auroral dynamics researches is the selection of proper coordinate system. The physically selected coordinate system in the magnetospheric trap is the coordinate system connected with isosurfaces (isolines in ionospheric projection) of equal magnetic flux tube volumes $W=\int ds/B$ (where ds is the element of magnetic field line length, B is the magnetic field). The distribution of W=const isolines was calculated on the base of Tsyganenco-87 magnetic field model. The second coordinate, which can not be greatly differ from ordinarily used MLT coordinate was selected as $\phi=2\pi\int_0^l dl/\nabla W/\oint dl/\nabla W$ where $(\nabla W)^{-1}$ was integrated along W=const isolines.

THE STRATIFICATION OF AURORAL PLASMA AND MULTIPLE INVERTED-V STRUCTURES

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The theory of hot magnetospheric plasma stratification was veryfied on the base of Intercosmos-Bulgaria-1300 satellite data. The theory can predict the number of formed structures. This number is determined by the parameter of stratification Γ depending on the field-aligned current density, the height-integrated Pedersen conductivity, and the half-width of upward field-aligned current band. $\Gamma \sim 1-3$ for one structure, $\Gamma \sim 8-9$ for two structures and $\Gamma \sim 30-40$ for three structures. It was found that there exist the excellent agreement between the experimental and theoretical values of the parameter of stratification and the number of observed structures.

CHARACTERISTICS OF PC1-2 AND IPDP GEOMAGNETIC PULSATIONS DURING LARGE-SCALE UNDULATIONS ON THE EVENING DIFFUSE AURORAL BOUNDARY

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By the Yakut chain data the intensity modulation of Pc1-2 type geomagnetic pulsations with periods of T=2-7 min have been revealed. The peak amplitude of Pc1-2 modulation and their transition to IPDP have been observed at latitudes of the precipitating proton peak flows when the Pc1-2 excitation region and the location of eastward electrojet and auroras have been moved to equatorward. Pc1-2 modulation source is large-scale undulations on equatorward diffuse auroral boundary measured by DMSP satellites.

DYNAMICS OF THE DAYSIDE AURORA USING SOUTH POLE ALL-SKY CAMERA DATA

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In this paper, we examine the dynamic behavior of the dayside aurora and its relationship to global magnetospheric activity using all-sky camera data from Amundsen-Scott South Pole Station (90°S) and available magnetometer datasets. The unique location of South Pole Station on the Antarctic Plateau enables continuous auroral measurements from mid-April until mid-August; furthermore, the dayside auroral cleft region can frequently be monitored for several hours of each day. Wherever possible, the dynamical features of the dayside auroras have also been related to changes in the interplanetary magnetic field, as well as to other ground-based measurements. The all-sky camera data were processed at World Data Center C2 (Tokyo) using a digitizing system called ARSAD (Automatic Retrieval System for Auroral Data). This system digitizes the all-sky camera image, producing a digital output which can easily be manipulated using computer methods.

AN EISCAT STUDY OF PULSATING ENERGETIC ELECTRON PRECIPITATION IN ASSOCIATION WITH AURORAL LUMINOSITY AND MAGNETIC FIELD PULSATIONS

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We present a case study dealing with EISCAT measurements of pulsating energetic electron precipitation (~5 - 30 keV) combined with ground-based observations of magnetic as well auroral luminosity pulsations. The event under consideration occurred during a magnetically quiet period on 1 February 1987 from 0:00 to 0:30 UT. Pronounced pulsations with a period of about 1 min were recorded in all measured quantities. The magnetic pulsations of this period exhibited in-phase oscillations over a spatial scale of the EISCAT magnetometer cross (some 200 km in longitude and 1000 km in latitude). Spectral analysis revealed also pulsations on a shorter time scale of about 10 s. These short period pulsations were, however, not seen in the precipitation flux of electrons having energies below 10 keV.

We checked on several mechanisms which could explain our observations. The precipitation of energetic electrons is most probably connected with cyclotron resonant interaction of electrons with whistler waves in the magnetosphere. In this frame work the long period pulsations can be attributed to temporal modulation of the energetic electron source which would result in a varying pitch-angle diffusion flux into the loss cone. The source modulation in turn could be explained by either one of two mechanisms. One is connected with large-scale variations of the magnetic field in the magnetosphere modulating the density and anisotropy of energetic electrons, while the other mechanism is based on an oscillating time dependence of the energetic electron injection rate during substorm. The pulsations with a period of about 10 s can be explained within the self-oscillating regime of the whistler cyclotron instability in the magnetosphere. This regime constitutes an intrinsic feature in the nonlinear behaviour of the instability and is not connected with an external periodic force.

Our event can be regarded as a manifestation of a two characteristic periods modulation scheme for the whistler cyclotron instability in the magnetosphere. To demonstrate the feasibility of our explanation we present computational results from a self-consistent instability model taking all the conjectured effects into account.

REGION OF SOFT PRECIPITATION IN DAYSIDE HIGH LATITUDES (CUSP) AND ITS RELATION TO AURORA DURING STEADY MAGNETOSPHERIC CONVECTION

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Steady magnetospheric convection intervals are chracterized by stable configuration of the magnetospheric and ionospheric structures. During such interval of 24 November 1981 the location and the configuration of the area of the cusp-like particle precipitation were determined from the data of dayside passes of the NOAA satellites. The cusp-like precipitation was found at invariant latitudes 71-75 between 09.30-12.00 MLT. The ground based magnetic and radar data show that this region coinsides with the dayside "convection throat" - the region where sunward convection reverses to antisunward. The location of the cusp-like precipitation region was compared with the aurora distribution patterns obtained from ground-based all-sky camera observations and from the DE-1 imager data. Ground-based data show that short-lived sporadically appeared discrete auroral arcs bound the cusp region from the morning side and the long-lived stable discrete arcs bound the cusp from the evening side. The cusp region coincides with the gap in the global distribution of discrete auroras. The cusp region lies polewards of the high-latitude boundary of the auroral emission (at VUV wavelengths 123-160 nm) belt observed by the DE-1 imager. This boundary, determined as 1kR intensity contour, is adjacent to the equatorward edge of the cusp in the evening side, but is about 1 degree of latitude away from it in the morning side. We interpret this evening-morning asymmetry as a result of the Region 1 current flowing up (down) in the evening (morning) outer side of the cusp.

EQUATORWARD AURORAL BOUNDARY DETERMINED FROM IK-BULGARIA-1300 SATELLITE MEASUREMENTS

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On the basis of data from IK-Bulgaria-1300 satellite the location of the auroral oval in the winter period 1981-1982 is investigated. The equatorward auroral boundary is determined using photometric measurements of the emissions 427.8 nm, 557.7 nm,630 nm and measurements of 1 keV electron flux and total energy flux. The dependence of this boundary on magnetic activity (as monitored by Kp index) and magnetic local time is inves tigated.

RAPID TEMPORAL AND SPATIAL VARIATIONS IN AURORAL OPTICAL EMISSIONS

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Spectral techniques for the analysis of rapid spatial and temporal changes in auroral optical emissions will be reviewed. Examples will be chosen to illustrate progress made in understanding appropriate generation mechanisms for phenomena such as auroral optical pulsations, superfast auroral waves and VLF waves associated with optical emissions.

Ionospheric electric field and associated auroral arc.

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An ionospheric electric field configuration observed by STARE in the vicinity of an auroral arc imaged by an all-sky video camera is studied. The electric field is shown to be comparable to that simulated by a simple model of the electric field of the arc superimposed on a realistic background electric field. In order to improve the fit, iterative adjustments to the ionospheric conductivity in the vicinity of the arc were undertaken by computer. The results of this process are presented and discussed.

AURORAL DYNAMICS AND MAGNETOSPHERIC DISTURBANCES NEAR THE SYNCHRONOUS ORBIT IN AFTERNOON SECTOR

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The signatures of magnetospheric substorms in the afternoon sector (12-18)LT are examined using ground-based data and data obtained on board GEOS-2 by magnetic field and energetic particle measurements. Analysis of the substorm developments allows to make several conclusions. 1. Before the substorm onset the adiabatic decrease of the energetic proton fluxes occurs with the decrease of the magnetic field near the synchronous orbit. 2. After the substorm onset the sharp decrease of the magnetic field and the injection of energetic protons were observed by GEOS-2. The data support the idea that the westward drifting energetic protons responsible for the asymmetric ring current in conjunction with substorm. 3. The appearance of the discrete auroral arcs poleward of the GEOS-2 footprint is accompanied by the enhancement of energetic proton ($E > 27$ kev) fluxes.

DISCRETE AURORA ARC. PROBLEMS AND WAYS OF SOLUTION.

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Although a significant progress in aurora arc study is achieved, many essential features of this phenomenon remain to be unclarified: 1) is there a velocity of aurora arc relative to magnetosphere convection or the aurora arc moves together with one?; 2) what is role of field aligned electric field in aurora arc generation?; 3) what is field-aligned current system connected with aurora arc?; 4) what is role of plasma freezing-in violation in aurora arc generation?; and others. The lack of resolution of these issues hinders a development of aurora arc generation theory. Aurora arc generation theories proposed by different authors can be divided into three groups: 1) Predominantly ionospheric origin. An appearance of plasma strips in the ionosphere are explained by redistribution of ionospheric plasma moving in electric field; 2) Predominantly magnetospheric origin. Enhanced plasma density strips arise in the magnetosphere due to interchange instability of magnetosphere plasma sheet; 3)Magnetosphere-ionosphere origin, when the regions play an equal important role. The latter theories are properly speaking an evolution of fundamental idea of Atkinson [1970] that aurora arc is produced by electron flux connected with field-aligned current flowing out aurora arc region. Proposed mechanisms of aurora arc generation predict different distributions of electric field and current over aurora arc, different position of the arcs regarding to plasma sheet boundaries, and different motion of the arcs regarding to magnetosphere convection. Unfortunately, just there points are unclear to a greatest degree. A new satellite generation with essentially better space and time resolution perhaps can provide the answer to the questions and clarify the aurora arc generation mechanism.

CORRELATING OPTICAL EMISSIONS, QUASI-PERIODIC VLF EMISSIONS AND MAGNETIC Pc3 PULSATIONS

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Regular magnetic pulsations of about 30-40 s periods (Pc3) have sometimes one-to-one correlation with quasi-periodic VLF emissions. It shows that the hydromagnetic wave can modulate the local parameters in space strongly enough that suitable conditions for particle interaction are formed. About a half of wavelenght phase delay is usually seen between quasi-periodic VLF emissions and ULF wave on the ground because of difference in propagation velocity of waves. Wave-particle interaction should cause particle precipitation which on the other hand should cause detectable optical emissions.

We have made simultaneous recordings of optical emissions, VLF emissions and magnetic pulsations in Porojärvi in Northern Finland at L value of 6.1 on January 1993. Optical emissions were recorded by a simple wide angle photometer based on silicon photodiode without any filtering. On January 15, 1993 in late morning hours about 0555 UT a strong Pc3 event occurred and it continued several hours. Optical pulsation started at 0605 UT and continued to 0720 UT when the sunlight stopped the optical measurement. During that about one and half hours we could see correlating periodic variations both in optical emissions and VLF emissions simultaneously with Pc3 magnetic pulsation. Perfect correlation between VLF waves and pulsations was temporarily seen after sun rising.

ON THE SPATIAL-TEMPORAL VARIATIONS OF PULSATING AURORAL PATCHES AND THEIR CONNECTION WITH VLF CHORUS

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The spatial and temporal variations of pulsating auroral patches and their connection with VLF radiation were considered on the basis of TV observations in the morning sector at the recovery phase of substorm. Simultaneous TV observations, VLF-radiation in the frequency range of 0.3-8.0 kHz and variations of geomagnetic field in ULF range with T > 1 sec were carried out close to southern boundary of auroral oval at stations Chupa (Northern Karelia) (L = 4.6) and Sodankyla (Finland) (L = 5.1).

It was shown that at the recovery phase of substorm in the morning sector VLF chorus were closely related to expanding pulsating auroral patches. During the lifetime (2-8 sec) the patches propagated and expanded mainly in eastward and equatorward directions on the distances 20-50 km with velocities by an order exceeding drift ones. A peak to peak correspondence between expanding auroral pulsating patches, trains of VLF chorus and ULF variations of geomagnetic field were observed during weak and moderate magnetic activity, amplitude of magnetic disturbance (H about 400 nT). In these intervals the repetition periods of patches and VLF chorus were about 6-8 sec and mean frequency of chorus elements in a train rized with time. Also during strong magnetic activity (H about 800 nT) an appearance of isolated auroral patches coincides with VLF chorus. However, the intensity of VLF chorus became lower up to disappearance with increasing of intensity of pulsating patches, expansion and shifting of a whole pulsating display equatorward.

Thus the relationship between expanding auroral pulsating patches and VLF chorus may be different depending on geomagnetic conditions. It is natural to explain high correlation between quasi-periodic pulsating patches and variations of intensity of VLF radiation during moderate geomagnetic activity by the development of cyclotron instability in the magnetosphere. The decreasing of VLF chorus intensity during the appearance of isolated bright auroral patches at magnetically active conditions seems to be connected with absorption of VLF waves in the Earth-ionospheric wave-guide and with changing of exiting conditions of VLF waves to the Earth surface (increasing of absorption in the lower ionosphere or/and reflection of VLF waves from upper boundary of sporadic E-layer which generates during precipitation of energetic electrons).

DEVELOPMENT OF LITERATURE DATABASE AND INFORMATION RETRIEVAL SYSTEM FOR THE STUDY OF COUPLING PROCESSES IN THE MAGNETOSPHERE-IONOSPHERE- THERMOSPHERE SYSTEM

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A B S T R A C T

The present paper evolved out of our attempt to survey, analyze and understand the recent trends for the AICPITS investigation, pertaining to the vast and complex area of Magnetospheric - Ionospheric - Thermospheric Coupling, as depicted in variations of the low latitude F-region emissions.

This attempt was made possible, due to the recent development of a computerised collection of literature database, of about 3000 references and 900 abstracts and an associated development of an "Users Friendly Information Retrieval System", named here simply as "Reference Library Software".

The present trends indicate that only a small fraction of this base refers to the study of coupling processes, although the size of the fraction appears to increase with the year. The collection was also used to identify the emerging trends, for future investigations in this area. Several advantages of this approach for young research scientists are described.

THE TRIGGER PHASE OF MAGNETOSPHERIC SUBSTORMS

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The growth phase of a magnetospheric substorm is generally viewed as an energy input phase, where plasma, momentum, and energy are obtained from the interplanetary medium (the solar wind) through some processes that are still not fully understood. At the initiation of the expansion phase the slow buildup of energy (showing up in the form of discrete auroral arcs) is suddenly interrupted, and an entirely new type of activity is begun. An auroral breakup, easily observed from the ground, is its most noticeable feature, followed by a westward travelling surge (WTS). The reason for the onset of the expansion phase has remained a mystery. We have begun a study of auroral breakups utilizing a long series of all-sky photographs and digital magnetometer network data. For a pilot study we have chosen 5 events. Here we discuss one event on 5 October, 1986, where we also have EISCAT data. There was a dramatic auroral fading over the whole sky at 19:28:43 UT at Kilpisjärvi, which lasted for over a minute. The EISCAT record shows a very low level of ionization at all altitudes at this time. The breakup occurred on the eastern horizon of Kilpisjarvi about 19:30:03 UT. The westward travelling surge passed the radar at 19:33 UT showing auroral ionization down to 85 km. To cause ionization at such a low altitude, the primary electrons must have been energized to 100 keV. A voltage difference along the field of 100 kV might be explained by an inductive electric field. The theory will be discussed.

THE ORIGIN OF FAST ELECTRONS PRECIPITATION IN THE POLAR ATMOSPHERE

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In the region of polar oval the electron acceleration take place along the magnetic field line in electrical double layers for regions of anomalous resistance. The generator of electric field is located in the magnetotail current sheet. The Hall electric field generation along the current sheet is demonstrated in the laboratory simulation experiment and by two-liquids MHD approximation. There is a possibility to solve the problem by numerical simulation. THe model explains the plasma jet injection into the magnetosphere at storms. The comparison with the measurements on satellites is discussed.

CUSP/CLEFT AURORAL ACTIVITY IN RELATION TO SOLAR WIND DYNAMIC PRESSURE, IMF BZ AND BY

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Continuous optical observations of cusp/cleft auroral activities within ~09-15 MLT and 70-76 degr. MLAT are studied in relation to changes in solar wind dynamic pressure and interplanetary magnetic field (IMF) variability. The observed latitudinal movements of the cusp/cleft arc in response to IMF BZ changes may be explained as an effect of a variable magnetic field intensity in the outer dayside magnetosphere associated with the changing intensity of region 1 field-aligned currents and associated closure currents. Ground magnetic signatures related to such currents were observed in the present case (10 Jan. 1993). Estimates of cleft/LLBL field-aligned current intensities indicate that additional contributions are required to account for the observed cleft auroral movements. Strong, isolated enhancements in solar wind dynamic pressure gave rise to equatorward shifts of the cusp/ cleft auroral arc and distinct ground magnetic signatures of enhanced convection at cleft latitudes. A sequence of auroral events of ~5-10 min recurrence time, moving eastward along the poleward boundary of the persistent cusp/cleft arc in the ~10-14 MLT sector, during negative IMF BZ and BY condition, were found to be correlated with brief pulses in solar wind dynamic pressure. Simultaneous photometer observations from Ny lesund, Svalbard and Danmarkshavn, Greenland show that the events often appeared on the pre-noon side (~10-12 MLT) before moving into the post-noon sector in the case we study here, where IMF BY < 0. In other cases similar auroral event sequences have been observed to move westward in the pre-noon sector, during intervals of positive BY. Thus, a strong pre-noon/post-noon asymmetry of event occurrence and motion pattern related to the IMF BY polarity is observed. We find that the category of auroral event sequence reported here is triggered by solar wind pressure pulses and argue that reconnection is the causative mechanism.

MODELLING THE VORTICITY IN THE IONOSPHERIC ELECTRIC FIELD ASSOCIATED WITH A LARGE SCALE FOLD PROPAGATING ALONG AN AURORAL ARC

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The appearance of an eastward travelling fold along an auroral arc, within the STARE radar field of view, coincides with a vorticity in the plasma flow pattern. Modelling, in which the fold in the auroral arc is treated as a current sheet, provides a good representation of the electric field corresponding to the improves the fit between the modelled and observed electric fields.

SC AS A TRIGGER OF SUBSTORMS FAR INSIDE THE POLAR CAP.

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The manifestations of special substorms far inside the polar cap at Spitsbergen (A=74) and Heiss Island (A=76) were considered after SC events detected at the Earth surface. All substorms triggered inside the polar cap were observed with some time delay (several minutes) relating to SC moment at the Earth surface. From the polar cap the substorms triggered spread equatorwards. Besides there were detected a special type of magnetic and auroral pulsations (T=1min.) which may be interpreted in terms of excitation of Kelvin-Helmholtz instability by SC discontinuities of solar wind on the interface between the Low Latitude Boundary Layer (LLBL) and Central Plasma Sheet (CPS). The model presentation permits to estimate the propagation velocity values of SC signal inside the magnetospheric tail.

NARROW-BANDED ELF EMISSIONS AND AURORAL ARCS

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Narrow-banded ELF emissions were observed on board of the polar orbit "Aureol-3" satellite. Electric and magnetic field data were received at Apatity Station (L=5.0). Emissions were occurred in the frequency range of 150-260 Hz, mostly during the winter season, in the evening sector (17-24 MLT), in the region of 65Ø-75Ø invariant latitude at altitudes 500-2000 km. On the basis of the "Aureol-3" satellite magnetic field wave data along with the ground-based magnetometer and all-sky camera data and global indices of the auroral activity a connection of narrow-banded ELF emissions with the substorm and auroral activations was investigated. It was found that narrow-banded ELF emissions were observed near auroral arcs and often during the growth phase of a substorm. The region of registration of these emissions was spread out for about 2 degrees of invariant latitude from the auroral arcs. The observed characteristics of emissions are in agreement with the mechanism of the generation of waves by electron beams in the multicomponent plasma of the topside ionosphere. According to this mechanism the waves are generated in the auroral particles acceleration region and these waves may be observed in and below the generation region. Characteristics of the acceleration region of auroral electrons are discussed.

IRREGULAR PULSATIONS OF GEOMAGNETIC FIELD WITHIN 0.5-5 HZ RANGE ON L=3-4 DURING PULSATING POLAR AURORAS

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At Yakut chain stations Zhigansk (L=4.1) and Yakutsk (L=3.0) Pi1 pulsations within 0.5-5 Hz frequency range with central frequency 3+0.5 Hz have been revealed by active band-pass filters. They are observed during intensive geomagnetic disturbance (K>5) in night-morning hours the background of Pi1B and Pi1C and can be accompanied by auroral pulsations in this frequency range. Main spatial-temporal characteristics of high-frequency geomagnetic pulsations are presented and their possible sources are discussed.

COMPARISON OF THE LOCAL ELECTRON DENSITY VARIATIONS IN THE E-LAYER DURING SUBSTORM ONSET WITH OPTICAL DATA

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Incoherent scatter radar is an excellent tool for studies of rapid local E-layer electron density variations during dynamically varying aurora. No similar information can be obtained by standard classical measurements like ionosondes, or even by rockets. Combined with optical observations by auroral TV-camera, incoherent scatter measurements give valuable information on the relationship of density variations to the passage of auroral forms. In this paper we present results based on an experiment designed to monitor the E-layer electron density with 200 ms temporal and 1050 m spatial resolution. The radar beam was field-aligned and supporting instrumentation consisted of optical, magnetic and VLF experiments. On January 18, 1993 at 2054 UT a brilliant substorm onset took place above Northern Scandinavia and the active auroral forms reached the radar beam almost immediately after the break-up. The electron density variation in the radar beam is shown at different altitudes and comparisons have been made between the observed electron density variations and optical measurements.

AURORA AND AURORAL RADAR BACKSCATTERING

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Using recent ideas on the backscatter signatures of the ionospheric tilts (Moorcroft,1989; Uspensky et al.,1993) and the idea on VHF ricochet/whispering-gallery propagation by ionospheric curved layers (Andre et al.,1991) the authors revise the known facts on mutual behaviour of the aurora and auroral radar backscatter during a substorm. The curved and tilted ionospheric layer effects and the early arguments regarding the backscatter as a function of the ionospheric E-field and electron density, those as the whole (as the authors believe) allow to explain the aurora/radar aurora bordering effect in different aspect angle condition, the auroral radar backscatter nearby auroral arcs running with the supersonic velocity, the discrete and diffuse backscatter including a gap between them in a vicinity of the auroral arc and other features. However the authors should note that due to the small-scale temporal and spatial dynamics of the effects it is rather a heavy task to collect a full set of independent data data fitted to support the ideas discussed.

GEOMAGNETIC PULSATIONS AND AURORAL DYNAMICS IN THE COURSE OF A MAGNETOSPHERIC SUBSTORM

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Distribution of auroral luminosity and discrete forms dynamics were analyzed during the magnetospheric substorm on September 23, 1986 development based on ground all-sky camera observations in Scandinavia and Viking satellite images. The magnetospheric substorm generation was accompanied by the appearance of Pi2 pulsations train on Lovozero, Kilpisjarvi and Rovanijemi stations. Spectral and coherent analysis of the pulsation characteristics allowed to reveal several peculiarities of the pulsations behavior in dependence on discrete aurora dynamics. Special attention was devoted to temporal succession of the auroral substorm and micropulsation onset.

DAYTIME GEOMAGNETIC PULSATIONS ASSOCIATED WITH IONOSPERIC TRAVELLING VORTICES.

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Spectral and morphological characteristics of geomagnetic and auroral pulsations during the high-latitude geomagnetic impulse events have been investigated on Spitsbergen magnetic and optical data. Special features of the pulsation regime behavior and the relationship between pulsation features and the structure and dynamics of the travelling ionosphere current vortices are examined. It is shown: 1) magnetic impulses are accompanied by short-time (10-15 min) increase of geomagnetic pulsation power at the period ranges 5-100 s in both H- and D-components; 2)there is a broad maximum in the average spectral distribution of pulsation at the periods of 10-60 seconds. However, in individual cases a few narrow spectral peaks can be seen within this frequency range; considerable changes of the oscillation regime of 30-60 s geomagnetic pulsations take place when the centers of the travelling twin vortex pass near the station's zenith. Evidently, the generation of this type of pulsations is closely connected with the current system of magnetic events; 3)increasing of geomagnetic pulsation power of the periods 10-20 s are connected with both the appearance of travelling twin vortex and the electron precipitations responsible for dayside pulsating discrete auroras.

INVESTIGATIONS OF SPACE-TIME BEHAVIOUR OF DISTURBED POLAR IONOSPHERE BY OPTICAL TV AND LOW-FREQUENCY ELECTROMAGNETIC FIELDS MEASUREMENTS

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Previous studies have shown that the 2-dimensional electron density distribution at heights of E-layer maximum of disturbed polar ionosphere may be obtained by the digital processing of auroral TV data with a use of the incoherent scatter facility as calibrator. Now rather obvious "one-to-one" correspondence has established between variations of the auroral luminosity received by means of the narrow-field zenith photometer and TV data integrated over field of view this photometer.That allows us to obtain space-time electron density distribution in the field of view of TV camera, when electron density profile has calculated from the narrow field spectral photometers data.

Connection of the pulsating auroral patches with magnetic field variations and natural VLF emissions of chorus type has founded. Time evolution of isolated auroral patches well correlates with magnetic pulsations of some types, that is evidence for their ionospheric origin. The auroral patches that have connected with VLF emissions have characterized by perceptible changes in their position during the event."One-to-one" correspondence between intensity variations of the pulsating auroral patches and envelope of VLF emissions as well as the violation this correspondence in time of aurora intensification testifies about close connection of the exit region of VLF emissions into the Earth-ionosphere waveguide with the region of spatial inhomogeneity of electron density that the auroral patches are.