3.7.1. THE RESULTS OF EXPERIMENTAL INVESTIGATIONS OF SPACE PROCESSES

Measurements of different types of space radiation are conducted on a number of satellites by different devices developed and constructed in NPI MSU on the phase of the decrease of 23 cycle of solar activity. Experimental investigations on the boards of "CORONAS-F" and "METEOR-3M" satellites are produced. The monitoring of radiation environment is conducted in the magnetosphere of the Earth on the high apogee satellites "Express-A2 and A3" (geostationary orbit) and "Molnia-3K" (elliptical orbit), on the board of International Space Station. The great numbers of new experimental data have been obtained. The satellite "GLONASS" with NPI MSU devices is successfully lunched in the December 2005.

Project "*CORONAS-F*"

The satellite CORONAS lunched 30 June 2001 on the orbit with height ~ 520 km and inclination of the orbit to the equatorial plane 83°. The scientific devices began to operate 14 August and continue to work till 6 December 2005.

The devices measured the fluxes of neutral radiation during solar flares: X-rays and gamma radiation with the energy 0.03–200 MeV, neutrons with energy >20 MeV; fluxes of electrons with energy 0.3–108 MeV, protons with energy 1–90 MeV and nucleus with energy 2-40 MeV/nucleon. Particle detectors give the possibility to measure fluxes and spectra of solar energetic particles (SEP) in the polar caps, changes of the scales of polar caps at the time of arrival of coronal mass ejections (CME), changes of the structure of radiation belts, particle fluxes and spectra during quite time periods and geomagnetic storms.

It is necessary to mention that only CORONAS-F measured fluxes of gamma ryes with energy near 100 MeV which can appear due to decay of neutral pions during modern cycle of solar activity. Only 11 flares with such radiation were observed during all history of satellite measurements including 4 flares on CORONAS-F. 11 neutron flares were observed including 3 on CORONAS-F. Fluxes of positrons appearing due to decay of charged pions were observed in the flare 28 October 2005 in addition to fluxes of gamma rays from pions and neutrals. The flare 20 January 2005 represent the real interest. It was observed when the satellite was near the equator. The additional increase of the flux of energetic charged particles was observed during the period of the decrease of the flux of gamma rays on the phone of galactic cosmic rays. It is possible to determine the energy of these particles analyzing the latitudinal geomagnetic cutoff. The flare of 20 January in hard braking radiation 6–10 MeV and in the radiation of pions is shown on Fig. 1. The data of fluxes of SEP are also shown. The increase of SEP began at L ~ 1.5 in 6 h 56 min. The increase of measurements of neutron monitor in South Pole began in 6:49 UT. The observation of protons at L ~ 1.5 with the threshold energy 6 GeV with time delay gives the information of maximal energy of accelerated protons.

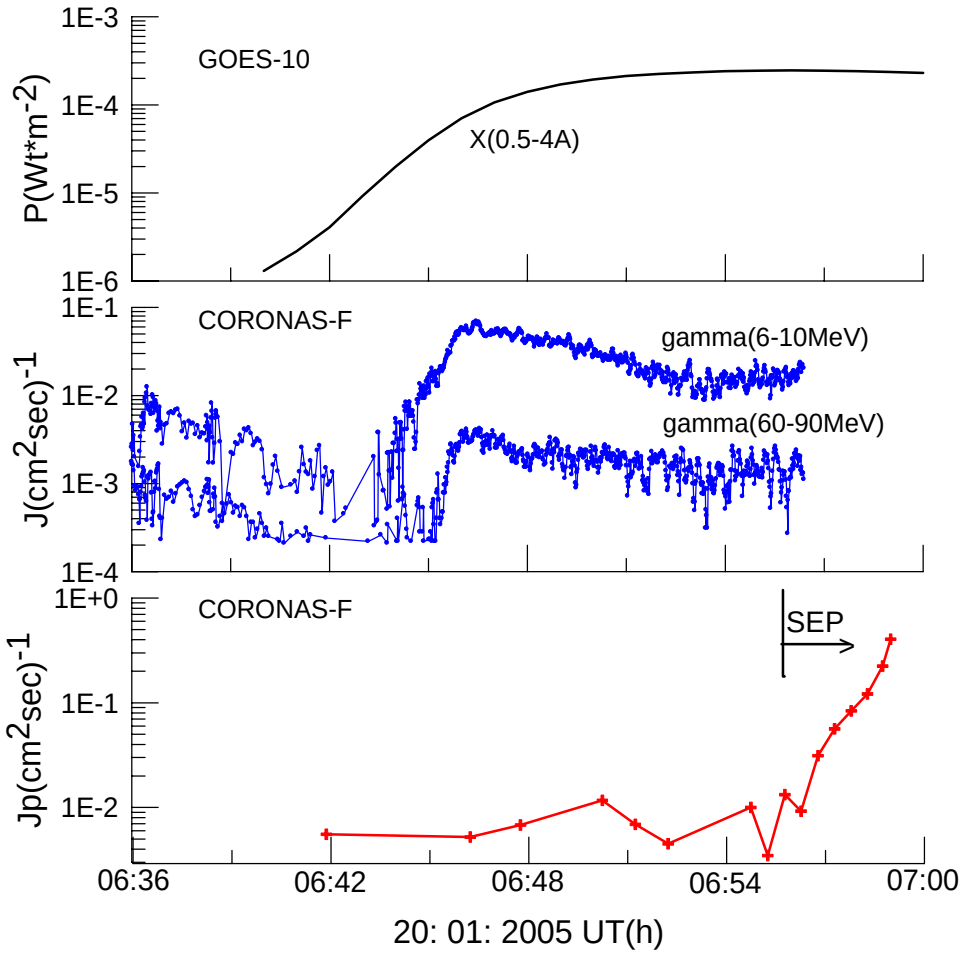

Fig. 1. The comparison of the results of observation of solar flare 20 January 2005 in the thermal X-ray radiation (GOES 10), hard gamma-radiation and in relativistic energetic particles (CORONAS-F)

Solar flares are acompannies by CME which produce great geomagnetic storms in the magnetosphere of the Earth. Two effects are observed simultaneously on CORONAS-F:

1. The boundary of penetration of protons of SEP with energy of tens of MeV is moved from the geomagnetic invariant latitude ~63 till ~50°. The absorbed doze on the International Space Station (ISS) in such conditions can be determined not by the protons of the inner radiation belt but the protons of SEP. Such effect was observed after flares 28 and 29 October 2003.

2. The daytime boundary of the magnetosphere is moved from the distance 10–11R_3 till 4–5R_3. The nightside boundary of the external radiation belt at that time moves from L ~ 7–8 till L ~ 3–3.5. This means the sharp decrease of the region of closed drift shells. It is possible to say that the external radiation belt at low altitudes disappears and it restored after storm.

Fig. 2 shows the lines of equal invariant latitude of the boundary of the penetration of solar energetic protons with energies 1–5 and 50–90 MeV in the late dawn and dusk hours in the dependence of Dst and Kp. It is possible to see that solar protons penetrates deeper in the late dusk hours then in dawn hours and can represent the serious danger for ISS.

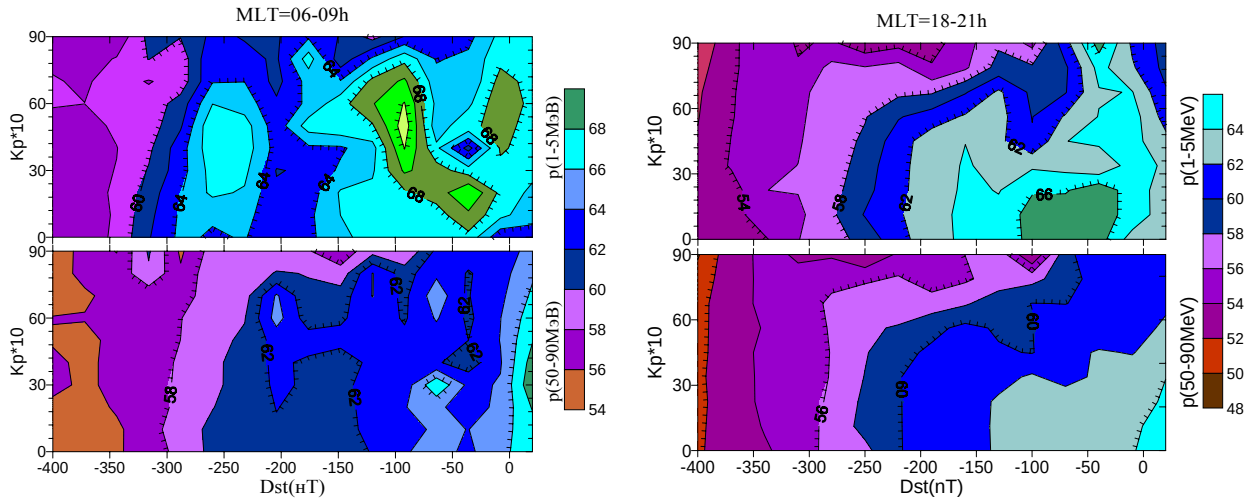

Fig. 2. Lines of equal invariant latitude of the boundary of the penetration of solar energetic protons with energies 1-5 and 50-90 MeV in the late dawn and dusk hours in the dependence of Dst and Kp

Project Meteor-3M

The satellite "Meteor-3M" No 1 is the multi aim device, which gives the possibility to decide simultaneously the problems of the investigation of the nature resources, the control of the environment conditions, hydrometeorological and heliosphysical testing. It was lunched on the heliosynchronous orbit by the rocket "Zenit" from the Baikonur cosmodrom 10.12.2002 on the orbit with height 1018 km and inclination 99.63 grad. Table 1 contains the main technical characteristics of the satellite. The complex of devices of the satellite "Meteor-3M" №1 in accordance with the aims is divided on 3 parts:

1. Visual informative nature-resources complex (BIK-M1).
2. Complex of scientific measuring devices (BKNA).
3. Complex of meteorological devices (MP-700M).

Devices of heliophysical control created in NPI MSU KGI-4S and MSGI-5EI are designed for the control of the environment conditions. It includes the control and prognosis of solar flares, control and prognosis of the radiation conditions, geomagnetic field, prognosis of the conditions of radio wave propagation, diagnostic and control of the conditions in magnetosphere and ionosphere.

One of the applied aspect of the exploitation of the device KGI-4S and MSGI-5EI is the support of more reliable and effective work of space satellites due to taking into account and operative prognosis of heliophysical conditions in the near the Earth cosmic space on the stages of the satellite designing.

Orbital parameters and the main technical characteristics of "Meteor-3M" No 1 satellite

Local solar time of rising knot ..... 9 h 15 min ± 15 min
Height under the Earth's surface, km 1018,63–10,71
Inclination, grad 99,63
Time of circulation, min ..... 105,33±0,06

Eccentricity 0,000806
The angle distance between turns, grad ..... –26,334
Daily change of the longitude of rising knot, grad ..... –8,670
Period of izorote ..... 3 days (41 turn)
Whole mass. kg 2600
Mass of the paying load, kg 800–1000
Time of operation, year ..... greater than 3
Parameters of three axial orientation:
- accuracy, angle min 10
- accuracy of the stabilization, grad/s 0,005

Measurements of auroral particle fluxes is produsd by the spectrometer MSGI-5EI. This device has next 4 modes of measurements: high sensitive spectrometric module of low energy ions (protons); high sensitive spectrometric module of low energy electrons; low sensitive spectrometric module of low energy electrons; module of the measurements of integral flux of charged particles of medium energy (mainly electrons with energy > 40 keV).

The detecting of low energy particles, division on energy and charge is realized by two kinds of spectrometric modules representing the cylindrical electrostatic analyzers, secondary electron multiplies of the type VEY-6 (low sensitive module) or VEY-7 (high sensitive module), charge-sensitive amplifier and the device for the formation of normalized impulses. The spectrometric modules produce the measurements of differential energy spectra of low energy ions (protons) and electrons in the energy range 0.1-20 keV. Dynamical range of the measurements in the ion channel constitutes 10^3-10^8 particles/cm^2·s·ster·keV (for ions of single energy).

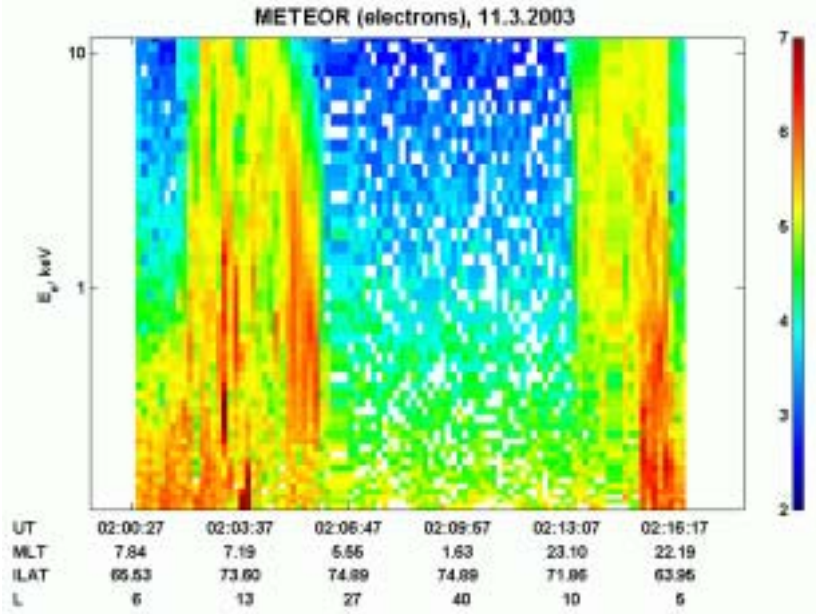

Fig. 3. Spectrogram of electron fluxes measured on satelleite METEOR-3M 11.03.2003

Dynamical range of the measurements of low energy electrons for the specrometer MSGI-5EI constitute $10^3 \ldots 2 \cdot 10^9$ particles/cm^2·s·ster·keV.

Measurements of energy spectra of electrons and ions (protons) can be conducted in 2 regimes: regime of the investigation of space-time variations in the periods of heliomagnetic disturbances (regime 1) and regime of diagnostic (regime 2). The full time of the measurements of energy spectra constitutes 2 s, the number of energy channels is equal 10 in the first regime. The full time of the measurements of energy spectra constitute 10 s and the number of energy channels is equal to 50 in the second case. Regimes of the work are determined by the concrete conditions of measurements and are controlled by the external commands. Buttent gas discharge detectors realize measurements of charged particles of medium energy. Dynamical range of the integral channel constitute $10^0 \ldots 10^3$ imp/s. Measurements are realized in monitor regime independent on the regime of the work of spectrometer. Fig. 3 demonstrates the example of auroral oval crossing.

Project "*University-Tatiana*"

The satellite "University-Tatiana" was lunched 20 January 2005 on the polar circular orbit with the inclination 82° and height 950 km to the 250 Anniversary of MSU. The satellite was equipped by scientific devices created in NPI MSU with the active participation of students and post graduate students of the physical faculty of MSU. The great volume of experimental space physical information has been obtained for the year of successful operating. It became the basis for the creation of data base of space experiments in NPI. The universal interface for the access to the data has been developed using Internet (cosmos.msu.ru). The space physics practicum on the base of experimental information from satellite "University - Tatiana" has been created for the students of physical faculty of MSU and another institutes (in particular for students of Ulianosk State University). The possibilities of remote doing of practicum tasks using Internet have been created. The example of registration of proton fluxes with energy 40-100 MeV 8 March 2005 are shown on Fig. 4. The increase of energetic proton fluxes in the region of Brazilian anomaly is well observable.

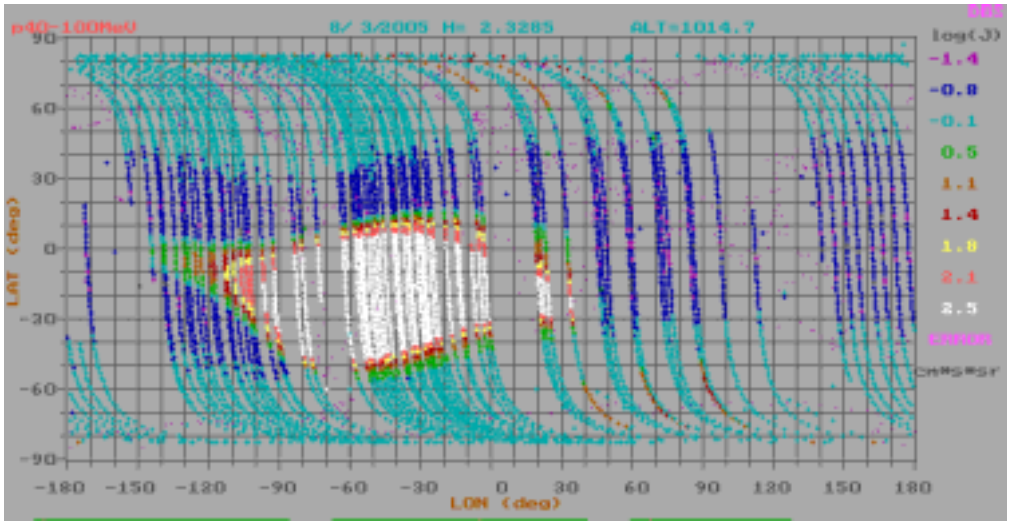

Fig. 4. Results of registration of proton fluxes with energy 40–100 MeV by the satellite "University-Tatiana" 8 March 2005

The device for the observations of ultraviolet radiation (UV) in the wavelength 300–400 nm has been included in the list of scientific devices of the microsatellite "University-Tatiana". The device was constructed for the observations of atmospheric fluorescence created by different sources: cosmic rays and radiation belt particles precipitating into the atmosphere, meteors, and electric discharges in the atmosphere. The detector of the device is the R1463 type photoelectron multiplier. The directional diagram with the aspect angle 14° is formed using multi channel collimator. The field of view of the device is oriented in nadir. The device gives the possibility to observe the flux of UV radiation in 2 types of measurements. The monitoring of UF phone brightening of the atmosphere every 4 c is produced with the time of integration 64 mc in the first type of measurements. The second type of measurements suggests the registration beginning by the command of the system of control and selection of light signals higher then definite threshold. Such signals are measured with high time resolution. Two variant of measurements are used in such a case (a) — with the duration of scanning 4 mc and step of measurements 16 mc, and (b) — with the duration of scanning 64 mc and step of measurements 256 mc. 256 points are measured in both variants. Such type of measurements gives the possibility to obtain the time profile of flash in the atmosphere in the range 0.1–64 mc. The limited satellite telemetry gives the possibility to send on the Earth only one the brightest flash on the satellite turn. Fig. 5 demonstrates the distribution of flashes on geographic coordinates. 50 flashes from observed in January 2005 83 flashes were localized in the equatorial region from 10° north latitude till 10° south latitude.

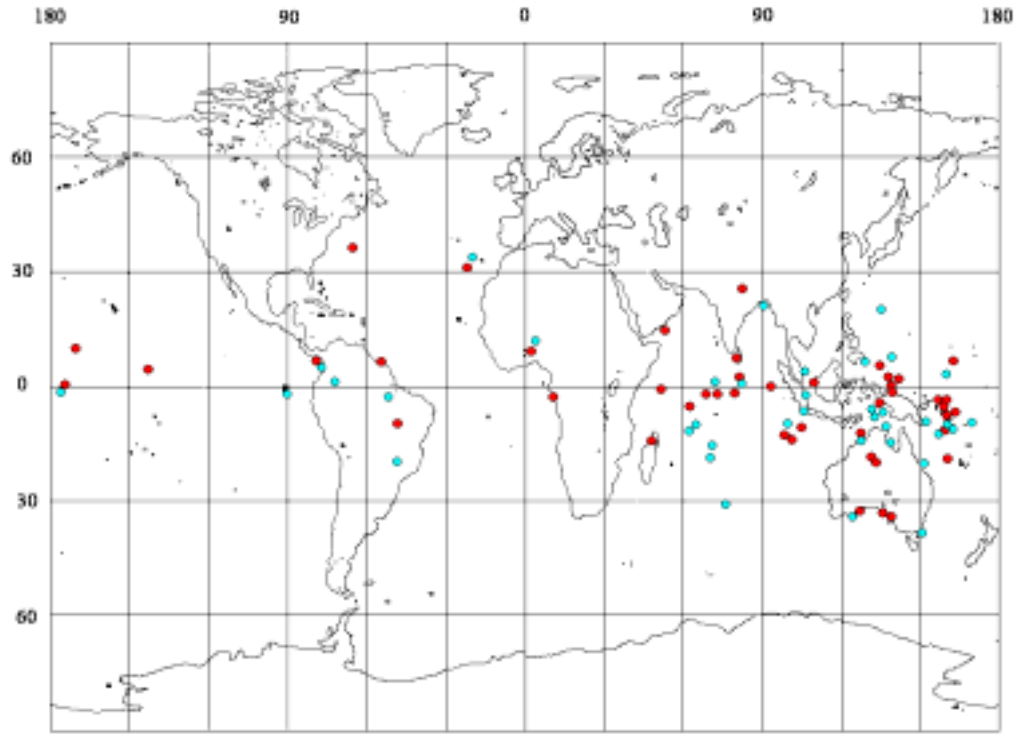

Fig. 5. The distribution of UV flashes with the duration 1–4 mc (red points) and 10–64 mc (blue points) on the coordinates on the Earth

The parameters of observed UV flashes: duration of the order of milliseconds, time profiles, the energy selected in fluorescent UV radiation of the order of $10^{12} – 10^{13}$ erg give the possibility to find connection with now intensively discussed electric discharges between clouds and ionosphere *(Sprite, blue jet)*. The knowledge of spectral characteristics of luminescence is necessary for the determination of the type of discharge produced by the flash in the atmosphere. The work in this direction is planned.

3.7.2. RESULTS OF THEORETICAL INVESTIGATIONS AND MODELING OF PROCESSES ON THE SUN, IN INTERPLANETARY MEDIUM AND THE MAGNETOSPHERES OF THE EARTH AND PLANETS OF SOLAR SYSTEM

Mathematical modeling of the convective processes on the Sun

The role of sell convective flows and Hall effect is investigated in the increase and structuring of solar magnetic fields and the action of mechanism of global dynamo. The main idea of the used approach is the individual ("deterministic") description of structures appearing in the field of velocities and magnetic field. The investigated convective mechanism of the formation of magnetic configurations can be the elementary "stone" of global geomagnetic dynamo-mechanism.

The main results of investigation:

1. Computer modeling of sell magnetohydrodynamic convection in the horizontal sheet of fluid (see Fig. 6) is produced for the case of compressible medium and the region of possible conditions of the problem is increased. The cases of oblique magnetic field are included. It is shown that the qualitative features of the process obtained in the calculation for the noncompressible liquid are saved in the investigated region of parameters. Six angle convective sell forms the structure of increased magnetic field if the initial magnetic field has the horizontal direction. The structure has the bipolar character and has small details. The results for the case of oblique magnetic field have the principally new character. The formed increased field is the superposition of bipolar and unipolar components. The contribution of the later is increased with the increase of the angle of inclination of the initial magnetic field to horizontal plane.

The obtained results show that big possibilities in the formation in situ magnetic configurations of solar type are contained in the analyzed convective mechanism of increase and structuring of the magnetic field. They are the consequence of the sell flow. Discussed mechanism represents the alternative to the well known model of flowing magnetic flux tube. Its main advantage is the better agreement with observations and absence of necessity in any suggestion about the mechanism of the formation of magnetic flux tube.

2. First results in the solution of the problem of global "sell" hydromagnetic dynamo acting in the rotating spherical shell due to existing of sell type thermal convection have been obtained. The possibility of the action of dynamo mechanism which support in global scale changing sign whole magnetic field and

systematically produce new and new magnetic structures (mainly bipolar) every of which are connected with convective sell was demonstrated. The regime is found in which convection in spite of the rotation forms stable small changed multiangle sells (i.e. the transportation to the meridionally stretched convective rollers - “bananas” does not take place, see Fig. 7).

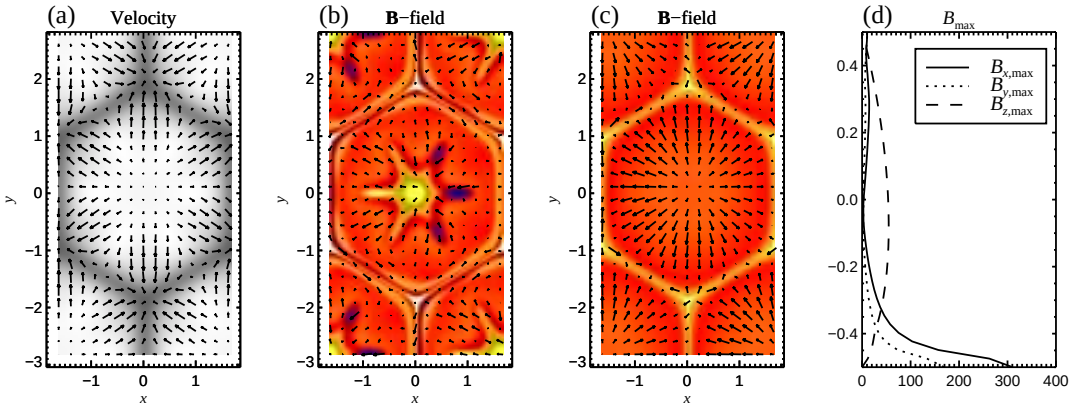

Fig. 6. The action of the convective mechanism of increase and structuring of magnetic field in the case of the beginning magnetic field inclined to the horizon at the angle 45°. The velocity field in the middle horizontal plane (a), the magnetic field near the lower boundary of the layer (b) and in its middle horizontal plane (c), the vertical distribution of maximal on the sell meaning of three components of the magnetic field (d) are shown. Positive values of vertical (z) components of vectors are presented by light lines, negative by dark lines, horizontal components by arrows

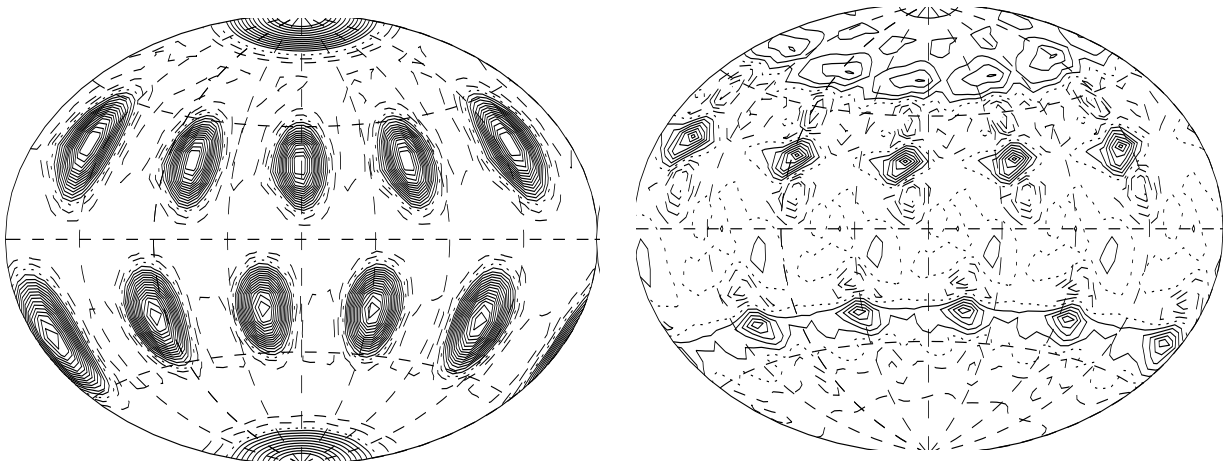

Fig. 7. Characteristic features of the structure of the flow (left) and magnetic field (right) in the problem of sell dynamo, determined for the definite moment of time. Thick lines are the isolines of positive radial component of the magnetic field, hatched lines — for negative, dashed lines for zero

3. The solution of MHD equation with Hall effect and magnetic viscosity for rarified plasma with current is obtained. It is shown that this effect can create thin stationary current sheets on the Sun and stellar atmospheres at heights where plasma is rarified and Hall effect can govern the changes of magnetic field. They have the form of vertical “drapery’ with increased density which are supported from the boundaries by the magnetic field. The current in these sheets is directed

against the local gradient of plasma density (upward) and the plasma moves downwards with acceleration.

Dynamics of magnetospheric processes

Dynamical model of the Earth's magnetosphere has been created (Fig. 8). A flexible structure of the model makes it feasible to calculate the structure and dynamics of the magnetospheric magnetic field, using data of measurements of the solar wind parameters and the geomagnetic activity level. One of the main results of the investigations is the development of an idea of the role played by the magnetotail current sheet in magnetic storm dynamics. The elaborated approaches enabled successful development of models for magnetospheres of the giant-planets, i.e., Jupiter and Saturn. The International Standardization Organization (ISO) adopted the dynamical magnetospheric model as a basis for development of International Standard of the magnetospheric magnetic field.

The model of quick change of magnetospheric configuration after the catastrophe of the loss of equilibrium — the model of substorm activation is developed. It is shown using method of computer modeling of particle motions that this rebuilding includes the elements of selforganization: the spontaneous formation of extremely thin current sheets (CS) with scales of the order of ion Larmor radius take place. These structures have the fundamental role in the transformation of electromagnetic energy in the energy of plasma jets which is one of the most important processes in solar-terrestrial physics. Some specific properties of stationary thin current sheets in different regimes was determined: the appearance of oscillating structures and stabilization of oscillations, the appearance of "bisected" CS, the possibility of destabilization of drift disturbances, the influence of heavy ion component — oxygen ions. This feature is especially clearly observed in satellite experiments.

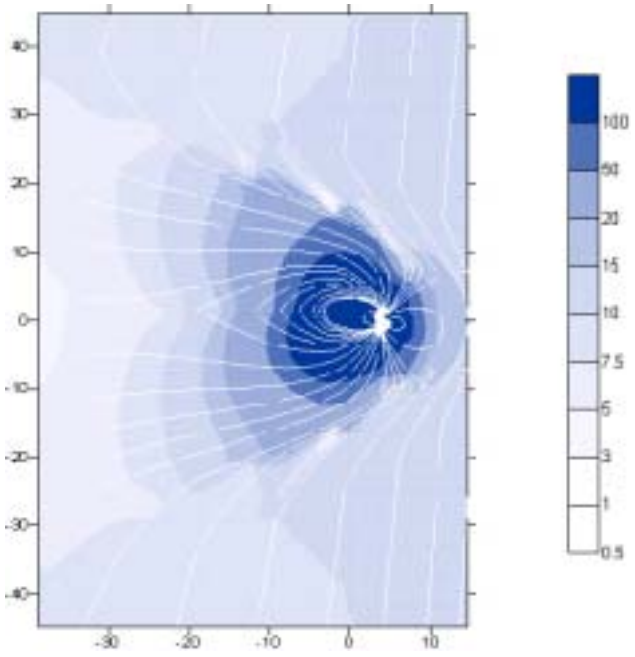

Fig. 8. The configuration of magnetic field lines in the model

The stability of plasma distribution in the magnetosphere of the Earth is investigated with the aim of the determination of the nature of magnetic storms and substorms. The concept of the formation of the plasma sheet of the magnetosphere of the Earth as the turbulent wake under the obstacle is suggested. The main instabilities leading to the formation of the spectra of the turbulence are investigated. The comparison of the predictions of the theory of magnetospheric substorm with the results of experimental observations is done. The reasons leading to the localization of substorm expansion phase onset on the equatorial boundary of the discrete auroral oval are selected. Plasma sheet turbulization and the appearance of the asymmetric on latitude of upward field-aligned current are selected as one of the main reasons such localization. The analysis of data of observations of the disturbances of the electric field before the beginning of the substorm expansion phase is produsedd. The support of the developed theoretical approach connecting the beginning of the substorm expansion phase with the generation of local electric fields in the region of maximal field-aligned current, penetration of cold electrons of ionospheric origin in the region of field-aligned potential drop and the formation of powerful thin sheet of field-aligned current is obtained. The experimental support of the theory of hot magnetospheric plasma stratification is obtained. It is shown that ring current responsible for the development of axially symmetric magnetic disturbances has the high latitude continuation mapped on the main part of the auroral oval and that the processes limiting the growth of plasma pressure can act in the magnetosphere of the Earth during magnetic storms. The theory of the formation of plasma pressure profile during magnetic storm in the magnetosphere of the Earth is developed. The theory takes into account the processes of plasma transport from external regions inside the magnetosphere and the filling of inner magnetosphere by accelerated ions of ionospheric origin. The method of the determination of plasma pressure using data of low orbiting satellites is developed. The method gives the possibility to restore nearly instant plasma pressure profile (with time resolution ~min) in the regions of near to isotropic plasma pressure.

3.7.3. RESULTS OF THE ANALYSIS OF SATELLITE DATA

Investigation of the radiation belts of the Earth and magnetic storms

The processes influencing on the acceleration of relativistic electrons during the recovery phase of the magnetic storm are investigated. It is shown that the main factor determining the increase of the fluxes of electrons is the existence of high level of substorm activity on the recovery phase of the magnetic storm. Figure 9 shows the dependence of the position of maxima of the increase of relativistic electrons L_{max} on the maximal during magnetic storm value of Dst-variation — $|Dst|_{max}$. The dependence is obtained on all range of known amplitudes of magnetic storms including the most great storm for the while history of satellite investigations — 13–14 March 1989. It is shown that multiple data of satellite observations correspond to the dependence $|Dst|_{\max} \sim (L_{\max})^{-4}$.

The analysis of experimental data during extreme solar events October-November 2003 produced exclusively big series of powerful magnetic storms is done. Home experimental resources represent now big complex of ground-based and space devices which can investigate solar-terrestrial activity. Five satellites ("CORONAS-F", "METEOR", "Exspress-A2", "Exspress-A3" and ISS) produced in Russia with NPI MSU devices worked simultaneously in October-November 2003 when the Sun "worked" in extreme regime. Russian ground-based stations worked simultaneously. The collaboration of a number of leading scientific organizations of Russian Federation is created on the base of NPI MSU (http://www.kosmofizika.ru/buri/buri.htm). Two international conferences Solar Extreme Events: Fundamental Science and Applied Aspects (NPI MSU, 12–14 July 2004 and Nor Amberd, Armenia 26–30 September 2005) were organised (http://see.magnetospere.ru).

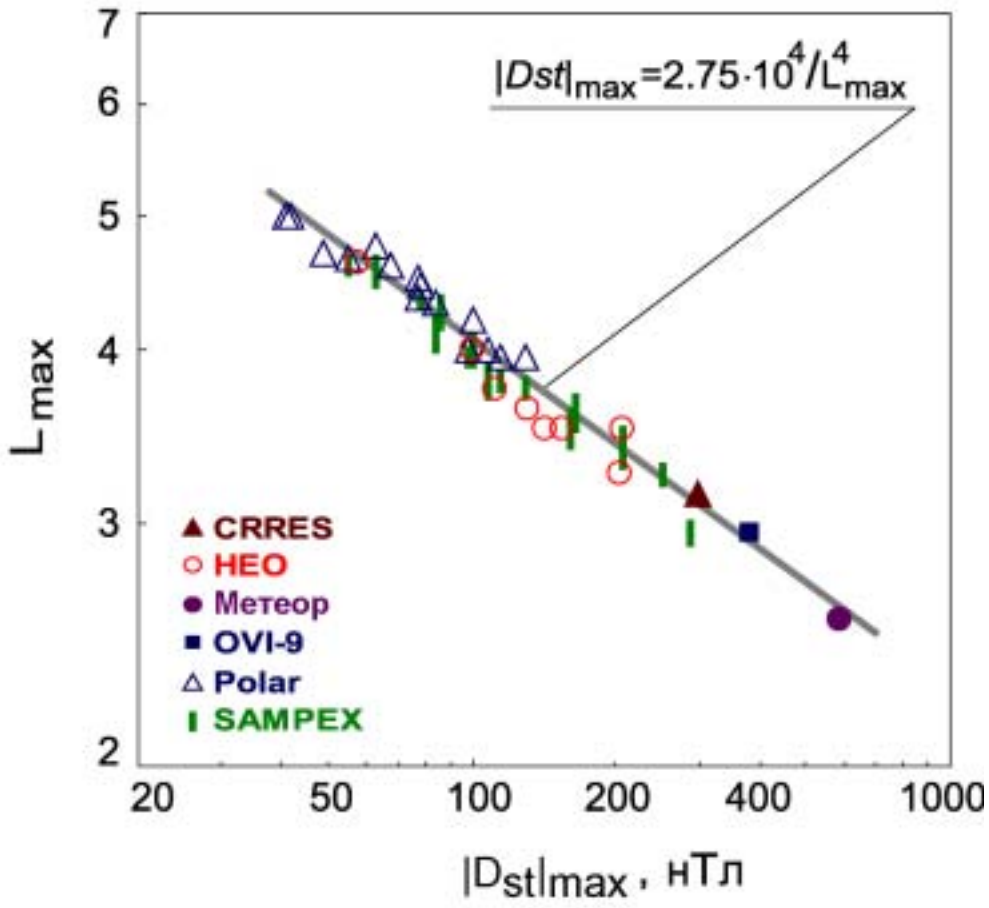

Fig. 9. The dependence of the position of maxima of the increase of relativistic electrons L_{max} on the amplitude of magnetic storm ($|Dst|_{max}$)

The correlation of the value of absorbed doze observed by staff dosimeter on the geostationary satellite "Express-A3", orbital station "Mir" and International Space Station during great solar events is investigated on the basis of developed model of solar cosmic rays and penetration of cosmic rays on the orbit and defense of space satellites. The good agreement of calculated values and experimental data is shown.

Temporal and spectral characteristics of hard radiation of X-ray pulsars in double systems

The data of X-ray measurements on the satellite "Prognoz-9" and orbital "Mir" station (the device GRIF) have been analyzed with the aim of the investigation of the dynamics of hard radiation of transient pulsars. The next transient (Be) pulsars can be observed by satellite instruments: A0535+262, GS1722-36, 4U1145-619, A1118-615, EXO2030+37, Sct X-1, SAX J2103.5+4545, IGR 16320-4751, IGR 16465-4507. The pulsating components of the sources A0535+26 and GS1722-36 have been selected on the reliable level of meaningfulness. The upper limits of the intensity of periodic pulsations have been obtained for other pulsars. The periodic component of the radiation A0535+26 connected with pulsations is observed on the phase of the flash slump of this source. Medium phase profiles of pulsations were obtained for different energy ranges on the different stages of the flash slump. The form of these profiles is typical for "ordinary" flashes of Be pulsars. The energy spectra for different temporal intervals were obtained. These dependences support well known correlation between the velocity of the changes of pulsation frequencies and the value of X-ray flux: the slowing of the rotation of neutron star and correspondingly some decrease of pulsation period takes place on the phase of flash slump. Medium phase pulsation profiles and energy spectra were obtained for one temporal interval of the observations of GS 1722-36 pulsar. The best spectra approximation was obtained in the case of power dependence with the index ~1.2. Such spectrum is harder then the typical energy spectra of the pulsating component of the radiation of transient pulsar. Table 2 contains energy fluxes and upper limits on the flux of energy of periodic pulsar radiation in the range 25–50 keV in accordance with experiment GRIF data.

Table 1

Pulsar	Interval of surch. c		Period of the most important peak. c	Interval of observations. TJD		Flux of 25–50 keV. erg/cm^2·c
	start	finish		start	finish	
4U1538-52	528.54	529.80	528.6585	10611.5	10615,2	1.86E-10
GX301-2	670	682	681.0352	10072	10581	1.50E-09
A0535+26	102.7	103.8	103.3563	10614.4	10614,6	3.71E-10
4U1145-619	291	296	291.319	10092.76	10095,67	7.83E-10
A1118-615	405	408	405.54	10385	10454	1.12E-09
GX1+4	120	128	123.2421	10102.46	10103,582	2.86E-10
OAO1657-41	37.40	37.75	37.716	10072.661	10087,781	8.70E-10
Vela X-1	283.00	283.55	283.122	10612.063	10612,333	2.81E-10
GS1843-02	94.1	94.6	94.5337	10604.659	10610,175	2.03E-10

4U1907+09	439.6	441.4	440.2933	10380	10500	2.31E-10
Sct X-1	110	112	110.4524	10604.659	10614,978	1.76E-10
GPS1722-36	410	420	415.8096	10604	10616	2.18E-10
EXO2030+37	41.632	41.667	41.6434	10102.396	10105,378	3.41E-10

Investigation of the extreme conditions of solar and geliospheric activity in the period of the decrease of 23 solar cycle

The comparative analysis of data on the nonstationary processes in the solar atmosphere and heliosphere is conducted for the periods of October–November 2003 and November 2004 – January 2005. Satellite data gives the possibility to better understand possible reasons of extremely great disturbances on the sun and in the heliosphere, connect their origin with the processes inside the Sun. The events of the transport of energy, momentum and mass in different spatial-temporal scales on the Sun are organized in the hierarchy of self-connected nonlinear processes. The conclusion about the absence of the connection of coronal mass injections and solar flares by cause and effect relation is supported. Both events represent the realization of two channels of free energy dissipation in the atmosphere of the Sun in the form of plasma motion and its radiation comparative role of which can be described by corresponding dimensionless parameter. The information about global asymmetry of the sun radiation is obtained. It is shown that the geometry of eruptive events has the great level of variability which is not connected only with “magnetic reconnection”.

The new event in the solar atmosphere is discovered – the formation, growth and disappearance of mushroom-type clouds due to eruptive processes which gives the possibility to understand many observable geometrical and physical features of coronal mass injections. The method of visualization of the magnetic field in the solar corona is suggested and realized. It is shown that the geometry of eruptive events has the great level of scales and structures which are not connected with the changes of the magnetic field topology.

The dynamics of selected loop prominences observed on the Sun and accompanied by eruptive flash is investigated. The acceleration and quick heating during the process of lifting of prominences loops take place. The scheme of the event is suggested showing the principally important role of the action of underphotospherical processes in the formation of global current loop.

The result obtained in 90-th showing that the most part of hard X-ray radiation of impulse flares is generated in the low layers of solar atmosphere is supported. It is shown due to the analysis of the temporal profile of gamma-radiation 2.2 MeV for the flare events 22.03.1991 and 06.11.1997 that the distribution of the density of solar material during flare differs from the standard model of the Sun. It is shown that the probability of the generation of solar cosmic ray events including during the extreme geoactive events in any selected period of time depends only from the sum of middle month solar spots for this period. The model description of the generation of relativistic particles in big solar flares is

suggested. It is shown that such flares have two phases. The breaking gamma-radiation till energy 60 MeV is observed on the first phase. Gamma-radiation with energy larger then 100 MeV appears only on the second stage and has the characteristic spectrum with maximum on the energy 70 MeV. High energy (>100 MeV) gamma-radiation and neutron fluxes from solar flares 28.10.2003 and 04.11.2003 is observed. These observations give the possibility comparing with another observations to determine times and heights of particle acceleration till relativistic energies and time of their leaving to the interplanetary space. The data base is created united figure and graphic information about increase of protons near the Earth and their possible solar sources (1144 of proton events with energy >10 MeV for the period 1975–2003).