BULGARIAN ACADEMY OF SCIENCES
SPACE RESEARCH INSTITUTE

SELF - EVALUATION
R E P O R T
2004 - 2008

Director:
(Prof. Dr. Petar Getsov)

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Self-evaluation report: actual situation (based on the period 2004-2008) and prospective development

I. Actual situation based on last five years achievements

1. Name of the research unit[1] and date of establishment. Organization chart of the Unit.

The **Space Research Institute (SRI) at the Bulgarian Academy of Sciences (BAS)** was established on 1 March 1987 (Resolution Nr-21/03.03.1987 of the Council of Ministers) based on the Group of Space Physics at the Presidium of the BAS (1969), which later evolved into the Central Laboratory for Space Research (1975).

The SRI-BAS carries out fundamental and applied research in the fields of Space Physics, Remote Sensing of the Earth, Space Technology, Space Biology and Medicine and Materials Science. The scientists of the SRI-BAS contribute to the development of hardware and software products for scientific equipment on board rockets, satellites, planetary probes and manned space flights. They also participate in data and image processing and interpretation, as well as in modelling of physical ionosphere-magnetosphere processes.

The first contributions of the SRI scientists were in the field of Space Physics – investigations of the earth ionosphere under the ***Intercosmos*** Programme. In 1972, after the successful launch of the P-1 device, the first scientific plasma parameters measuring instrument on board the *Intercosmos-8* satellite, Bulgaria ranked 18th on the list of "space" countries worldwide. In the period 1969-1981, the SRI researchers participated in the interpretation of the results obtained by their scientific equipment for direct experiments which flew on board the *Intercosmos - 12, 14, 19* satellites and the *Vertical - 3, 4, 6, 7, 10* geophysical rockets. The basic results of the latter concerned the structure and dynamics of the mid-latitude trough in plasma density and their relationship with other ionosphere parameters, the large- and small-scale drift structures and some other physical processes.

Bulgarian scientists organized and implemented two satellite programmes: ***Intercosmos-Bulgaria-1300*** and ***Meteor-Priroda*** on the occasion of the 1300th anniversary of the Bulgarian State's foundation, which was celebrated in 1981. The first satellite was intended for research in the field of Space Physics and contained 11 entirely Bulgarian-made instruments intended for measurement of ionosphere-magnetosphere parameters and their interactions. The second satellite was equipped with two Bulgarian devices for Remote Sensing of the Earth from the space. The scientific programmess and equipment for the **two Bulgarian astronauts**: Georgi Ivanov, who flew onboard *Soyuz-33* in 1979, and Aleksandar Aleksandrov, who flew onboard *Soyuz TM-5* in 1988 were elaborated and designed entirely on the suggestion of Bulgarian scientists. Most of the onboard instruments used on the MIR Space Station for investigations in the framework of the *Shipka* Scientific Programme in 1988 were developed by SRI teams of researchers.

A number of new scientific complexes were developed by Bulgarian scientists which operated onboard the **MIR Space Station** under international programmes funded by various sources.The *SVET* Space Greenhouse, launched in 1990, was the first automated plant growth facility, with which a number of long-term experiments were carried out by international crews up to 2000 (Shuttle'95, MIR-NASA), proving that plants could be used in Biological Life Support Systems for future manned space missions. The *Neurolab-B* medical system for examining the astronauts' physiological status was launched on the MIR ISS in 1994 under a joint project with the German Aerospace Agency (DLR). The *P-400* ultra-high-frequency

[1] Here, and hereunder, permanent research units (institutes, laboratories etc.) shall be meant.

spectrometer, developed in the framework of the *Priroda* International Remote Sensing Programme (France, Germany, Russia and USA), was launched in 1996.

Scientists from the SRI-BAS participated in the interplanetary projects VENUS-HALLEY and PHOBOS, as well as in one of the largest Space X-ray Observatories, the GRANAT mission.

The research and applied activity in the field of **Remote Sensing of the Earth and GIS** is focused on the development of algorythms and programs for interactive processing and classification of images. Some of the prepared and presented projects are: Corine Land Cover - Bulgaria (1991, 2000) for ecological monitoring and mapping of land cover with *Landsat* satellite data; PHARE-MERA - *Forest Ecosystems Mapping* and *Land Degradation Mapping* subprojects (1995-1998), funded by the EU. A digital map of the Central Balkan National Park was elaborated - a project for preservation of the biological diversity, funded under a Bulgarian-Swiss programme. A satellite atlas of Bulgaria was also prepared.

Scientists from SRI-BAS took part in a two-satellite **Interball Project on Space Physics** in 1995-1996 and developed equipment for electric field measurements (IESP-2M) by the *Interball* Auroral probe. An original method for deposition of vitreous carbon coating on the surface of spherical probes for precise plasma electric field measurements was developed, which was applied successfully on board the *Interball-2* satellite and the *Magion-4* and *Magion-5* sub-satellites, as well as on some *Intercosmos* satellites, rockets and balloons.

By Resolution Nr-15/09.01.2003 of the Council of Ministers, Space Research was approved as one of the five priority National Scientific Programmes for investigation and technological progress in Bulgaria.

2. Areas of activities and/or mission description.

As a leading organization of the Bulgarian Academy of Sciences, the Space Research Institute (SRI) is primary in charge of long-term planning and elaboration of space research programmes in close connection with national priorities of which a considerable part is performed within the framework of international space research cooperation.

The field of activity of SRI-BAS ranges over fundamental and applied investigations in space physics, astrophysics, image processing, remote sensing, life sciences, scientific equipment, preparation and conduct of experiments in the region of space investigation and use on board of unmanned and manned spacecraft, investigation of control systems, air- and spacecraft and equipment for them, development of space materials and technologies and their transfer to the national economy, education of post-graduate students and MS students.

The SRI-BAS works in close cooperation with similar institutes from Bulgaria and abroad. It takes active part in cooperative studies with various foreign and multinational establishments and organizations such as COSPAR, IAF, IAU, INTERCOSMOS, SRI-RAS, IBMP and IZMIRAN - Moscow, ESA, NASA, DARA, CNES, COPUOS-UN, NASDA, etc.

The scientific results of these projects were presented in great number of publications and congress papers.

Subject matter:

- Fundamental and scientific-applied studies;
- Research instrumentation;
- Preparation and conduct of experiments for Space and Earth study and use onboard manned or unmanned spacecraft;
- Studies on aircraft use and equipment design;
- Development and implementation of aviation and space materials and technologies and their transfer to economy;
- Research-coordination and research-methodic activity in the field of aerospace studies;
- Training of post-graduate qualification students and post-graduate students.

Research fields:

- **Space Physics:** Probe methods for ionosphere studies; Study of ELF/ULF waves and field-aligned currents; Study of the ionospheric effects above seismically active areas; Establishment of a database of satellite measurement data, methods, and analysis algorithms; High energy astrophysics.
- **Remote Sensing of the Earth:** Design, development, and transfer of techniques, instrumentation, and technologies for remote sensing of the Earth.
- **Space Technologies:** Aerospace control systems; Biotechnologies; Onboard optic range systems; Antifriction materials and covers; Composite materials based on glass carbon; Design of aviation and space materials and technologies and their transfer; Nanotechnologies etc.

The above-mentioned research fields are covered by the activity of the SRI's departments.
Link to the web-site of SRI – page SRI Structure: http://www.space.bas.bg/astro/eng.html
Below follows a brief description of their mission:

Space Physics Department

The scientific work of the Department is centered mainly on the following problems: large-scale structure of the density in earth plasma, electromagnetic structures in the magnetosphere, dynamics of the sub-Auroral ion drift, relationship between the parameters of the ionospheric-magnetospheric plasma and some large-scale ground-based phenomena; earthquakes, volcanoes etc.; study and improvement of the space sensor methods and techniques and their application in other fields. Some of present-day projects include investigation of super-large satellite charge in the presence of interaction with ionospheric plasma. A device for measurement of the surface charge of the International Space Station has been developed.

Astrophysics and Synergetics Department

Its activity is focused on investigating the dynamics and structure of accretion flows and their stability. For this purpose, it attempts to:

- Find the analytical descriptions of the physical flows driving these flows;
- Create numerical simulations showing structural formations and their evolution;
- Investigate the stability of the flow and the results of arised instability;
- Explain the origin of some kind of quick variabilities, observed from close binaries as a result of previous processes.

It aims to show that accretion flow is a live system with intricate structure.

Remote Sensing of the Earth Department

The major research task of the Department is related with monitoring and acquisition of remote sensing (aerospace) data which is used to study natural resources and ecological disturbances, make an inventory of agricultural objects, and study modern geodynamical processes and natural ecocatastrophes.

So far, the Department has accomplished more than 30 research projects concerning Bulgarian territory. By parallel use of remote sensing and ground-based data, morphostructural partitioning of the country was made; the major neotectonic structures are studied; ring and lineament morphostructures of various origin are identified, bearing different ores and minerals (ores, minerals, oil, fresh water etc.); and the glacial and fluvoglacial forms in the high Bulgarian mountains are studied.

Aerospace Information Center

The Department was created in 2006 and the main area of investigation, development and design is:

- onboard and ground-based automated systems for measurement, acquisition, processing and collection of aerospace data;
- receiving, processing and collection of aerospace data for monitoring of environment and security.

Space Biotechnologies and Vacuum Studies Department

The basic aim is to develop an automated system for precise measurement and control of environmental parameters in order to provide optimal biotechnology for higher plant growing under microgravity. Higher plants are a key component (food source and air purification) of a Biological Life Support System (BLSS) - a link of vital importance for the space crews during future long-term manned missions (first to the Moon and Mars). Research connected with improvement of technology and technical devices developed for plant cultivation: closed plant growing chamber with maintenance of air parameters and effective lighting system.

Vacuum Studies Laboratory for research of processes, materials and devices with space application in the conditions of high vacuum, flux of charged particles and ultraviolet radiation. Antifriction alloys for friction details working in vacuum are created.

Aerospace Engineering and Technologies Department

Investigations for development and transfer of aerospace techniques and technologies in the following major fields: space communications and navigation; systems for control and diagnostics of psycho-physiological state of the person in extreme conditions; nonstandard equipment for aerospace application; chaotic processes in nonlinear and parametric systems.

Aerospace Control Systems Department with Avionics Applied Research Laboratory

Research in the field of computer control systems with aerospace application and formal methods of software development. Development of computer devices and methods for investigation of operators of complex aerospace systems. Study and repair of avionics (gyroscopes and other devices).

Aerospace Control Systems Department

The Department conducts theoretic and applied studies in the field of on-board aerospace objects and ground-based control systems in the following fields:

- Carrying out scientific research intended to develop methods, algorithms, and program facilities to examine operators of complex technical systems – study and research of the modern approaches for complex decision-taking in the control of ergatic systems, allowing mathematical formalization and solution of the optimized tasks.
- Dedicated electromagnetic complexes for study of ion spherical-magneto spherical plasma and lithosphere phenomena – design of equipment for measurement of electrical and magnetic fields in wide frequency range for conducting of space and ground-based experiments.
- Establishment of CCD-based technologies of optical systems and processing of aerospace information – study of modern technologies and equipment for acquisition and processing of space information.
- Mathematical modelling of aircraft and satellite missions – investigation of the orbital parameters of Earth satellites taking into account various disturbing factors, such as modelling of Unmanned Aircraft Missions.

Space Materials and Nanotechnologies Department

The main task of the Department is synthesis and research of new materials and technologies. Methods based on detonation for the synthesis of nanostructures are developed and patented. Six modifications *of Ultradisperse Diamond Powders* (UDDP) with different grade of purity and specific density are ready for use. Currently working on the application of UDDP in the following fields:

- Deposition of chemical coatings, containing UDDP based on nickel, chrome, zinc;
- UDDP containing additives for lubricants and greases;
- UDDP containing polymer composite materials;
- Introduction of UDDP in special purpose paints.

The obtained scientific results have been the base for the successful participation in EU FP6 networks and projects.

3. Relation of the research areas and topics of the unit with the research policies and programs approved by the General Assembly (GA) of BAS, and with national and/or EU research priorities.

Application fields related with the research priorities adopted by the GA of the BAS:

- **Study of the Earth**, monitoring of the environment with integrated use of remote sensing of the Earth technologies, geographic information systems (GIS), and conventional ground-based methods. Development of strategies and methods for monitoring of environmental electromagnetic pollution using ground-based, aerial, and satellite data.
- **Study of man and animate nature by space biology and medicine**. Based on the Institute's long-lasting activity in the field of space biology and medicine, a new generation of space green house is being developed and a miniature Holter system to monitor astronauts' health and psychological condition has been designed which is used on pilots and in hospitals in the country and abroad.
- **Information technologies and communications:** Research tasks are implemented, related with techniques and instrumentation for high-precision control of movable objects; use of satellite systems for navigation purposes; radiolocation systems for traffic control (mainly, under contracts with the Ministry of Defense of the Rep. of Bulgaria).
- **New methods and technologies:** Production of composites by detonation pressing of metal powders and studying the phase transition mechanisms of carbon-containing compounds at pulse loading. The successful results in this research field and their high appreciation by the scientific community in the country and abroad led to the Institute's participation in projects and contracts under EU Programmes and bilateral agreements with Russia.
- **Advanced aerospace equipment spin-off technologies** are the subject of a number of contracts with Bulgarian aviation firms and industrial enterprises.

Relationship with the national and EU priorities:

The SRI-BAS is an interdisciplinary institute which is engaged in almost all scientific priorities of the EU utilizing high space technologies. The SRI relies on the EU programmes (mostly in the FP7 priorities such as Space, Security and Nanosciences) to procure funds for its research work. In parallel with this, the SRI strives to raise funds for science by participating actively in the thematic competitions organized by the National Scientific Fund at the Ministry of Education and Science of the Rep. of Bulgaria. Applied activity is another development line of the SRI aimed to benefit the State institutions (Ministry of Defence and Ministry of Emergency Situations). The Executive Council of the BAS and the Ministry of Emergency Situations set up 11 Problem Councils to concentrate scientific potential and enhance its effectiveness.

Scientific Priorities

Europe (FP7)	Bulgaria (strategy)	BAS (Problem Councils)	SRI
1. Health	1. Biotechnologies, food, and health	1. Medico-biological studies	Yes
2. Foods, agriculture (farming), and biotechnologies		2. Bioeconomics, biotechnologies and foods	Yes
3. Information and communication	2. Information and communication	3. Information and communication	Yes

technologies	technologies	technologies	
4. Nanosciences, nanotechnologies, materials science, and new materials	3. New materials, nanosciences, and nanotechnologies	4. New materials, nanotechnologies, and modern physical technologies	Yes
5. Energy	4. New and renewable energy sources and energy saving sources	5. Energy sources and energy effectiveness	
	5. Ecology, biodiversity, and biological resources	6. Ecology, biodiversity and biological resources	Yes
	6. Cultural-historical heritage, national identity, and social environment	7. Cultural-historical heritage and national identity	
6. Environment (incl. climatic changes)		8. Natural resources, risks, and climatic changes	Yes
7. Social-economic sciences and human potential		9. Knowledge-based economy and society	
8. Security		10. Security	Yes
9. Space		11. Space sciences and technologies	Yes
10. Transport (incl. aeronautics)			

4. Leadership of the Space Research Institute – Bulgarian Academy of Sciences

Director	**Prof. Dr. Petar Getsov**
Deputy Director - Science	Sen. Res. Dr. Tania Ivanova
Deputy Director - National & International Activities	Sen. Res. Dr. Lachezar Filipov
Deputy Director - Technical & Technological Problems	Sen. Res. Dr. Roumen Nedkov
Scientific Secretary	Prof. DSc Garo Mardirossian

Heads of Departments

Aerospace Control Systems	Sen. Res. Dr. Boytcho Boytchev
Aerospace Engineering and Technologies	Prof. Dr. Petar Genov
Aerospace Information Center	Sen. Res. Dr. Roumen Nedkov
Astrophysics and Synergetic	Sen. Res. Dr. Lachezar Filipov
Remote Sensing of the Earth	Sen. Res. Dr. Eugenia Roumenina
Space Biotechnologies and Vacuum Studies	Sen. Res. Dr. Tania Ivanova
Space Materials and Nanotechnologies	Assoc. Prof. Dr. Stavri Stavrev
Space Physics	Sen. Res. Dr. Stefan Chapkunov

Prof. Dr. Petar Getsov, Director of the Space Research Institute

MS in Avionics Engineering, Higher Air Force Military Academy (1969-1974); PhD in Avionics Engineering, *Prof. Zhoukovski* Moscow Higher Air Force Military Engineering Academy (1975-1978), Assoc. Prof. at the *G. Benkovski* Higher Air Force Military Academy (1974-1982), Res. Fell. at the Military Research and Development Institute, MoD (1983-1985), Chief of the Aviation Department at the Military Research and Development Institute, MoD (1983-1985), Leading Engineer of the mission of the second Bulgarian astronaut on board the MIR Orbital Station (1985-1988), Head of the Aerospace Control Systems Department of the SRI (1985-2008), Member of the Interinstitutional Committee on Space Issues at the Council of Ministers of the Rep. of Bulgaria (from 1999 to present), Strategic Course at the *G. Rakovski* Military Academy (2000), Professor in the Space Research Institute at the Bulgarian Academy of Sciences (2002), Member of the Dedicated Scientific Committee on Military Engineering at the Higher Testimonial Committee (from 1998 to present), Chairman of the Scientific Council of the Space Research Institute, Chairman of the Bulgarian Astronautical Association (from 1996 to present); **Major scientific and applied contributions:** Research articles - 165, Citations – 45, International projects – 18 , Implementations - 11, Inventions – 18. **Memberships**: Board of Editors of the *Aerospace*

Research in Bulgaria journal, Member of the Board of Editors of the *Observation from Space* journal, Russia.

Sen. Res. Dr. Tania Ivanova, Deputy Director of Science,
Head of the Space Biotechnologies and Vacuum Studies Department
MS in Electrical Engineering - Technical University, Sofia (1969), Developed the first Bulgarian space equipments launched onboard satellites and rockets (1970-1981), PhD in Physics – Systems and Devices for Direct Probe Measurement of Space Plasma Parameters (1981), Developed the first automated SVET Space Greenhouse for plant experiments onboard the MIR Space Station (1990-2000). **Major scientific and applied contributions**: Research articles - 220, Citations – 80, International projects – 16 (5 financed by NASA), Implementations - 20, Inventions – 6. **Memberships**: Executive Council of the Bulgarian Academy of Sciences, Expert Scientific Council on Geophysics at the Higher Testimonial Committee, Board of Editors of the *Aerospace Research in Bulgaria* journal.

Sen. Res. Dr. Lachezar Filipov, Deputy Director of International & National Activities, **Head of the Astrophysics and Synergetics Department**
MSc in Physics and holder of PhD degree from the Space Research Institute at the Soviet Academy of Sciences and the Physical Faculty of the Moscow State University (1983). Deputy Director of the SRI-BAS since 1987. Working in the field of accretion discs and X-ray astronomy for 25 years, author of more than 70 publications in peer-reviewed journals. Observed citations in the period 2004-2008 excluding self-citations: 18 in peer-reviewed papers and 3 in monographs. Elected Academician of the International Astronautics Federation – Fundamental Science. Leader of several tasks and projects, such as the *Sunflower* (fast rotating X-ray telescope), ROZHEN and SHIPKA programmmes, GMES (in the Bulgarian Academy of Sciences and National Contact Point for GMES), BALKANSAT (micro-satellite platform for GMES and Space Physics). Bearer of the honorary award of the Russian Academy of Science – medal "K. E. Tziolkovski" for originality and overall activity.

Sen. Res. Dr. Roumen Nedkov, **Deputy Director of Technical & Technological Problems**, **Head of the Aerospace Information Center Department**
MS in Electronical Engineering - *St. Petersburg* State Technical University of Television, Russia (1981), PhD in Engineering – Onboard Space Systems for Digital Signal Processing (1989), Developed the first automated digital system for medical investigation onboard the MIR Space Station (1988). **Major scientific and applied contributions**: Research articles - 150, Citations – 32, International projects – 10 (2 financed by DARA, 1 financed by UN-FAO, 1 financed by 5 FP), Implementations - 35, Inventions – 4. **Memberships:** Scientific Council of the SRI-BAS, Expert Evaluator under the PHARE Programme.

Prof. Garo Mardirossian, DSc,
Scientific Secretary of the Space Research Institute;
MS in Electrical Engineering – Technical University, Sofia (1977), PhD in Physics – New Techniques, Devices and Systems in Geophysical Complexes with Enhanced Technical and Operation Characteristics (1985), DSc – Climatological and Geophysical Parameters – New Techniques and Means for Studies (2004). **Professional Interests:** Geophysical and ground-based and space instrument design, remote sensing, natural ecocatastrophes and techniques and instrumentation for their study. **Scientific Articles and Reports:** – more than 100, Books – 5, Inventions – 26, Citations – 60, International projects – 8, Implementations – 22. Entered in the Golden Book of Inventors and Innovators (1999). Editor in Chief of the *Aerospace Research in Bulgaria* journal.

Sen. Res. Dr. Stefan Chapkunov, Head of the Space Physics Department
MS degree from the Technical University of Sofia (1966), PhD in Experimental Methods in Space Physics (1974). Working for the Institute since 1969 to present. Planning, organization, and conduct of national and international complex satellite experiments and processing the data thereof (1969-2000). **Major scientific and applied contributions**: Research articles – 195. Participation in 18 national and international programmes and projects in the field of design of space equipment intended for scientific studies, interpretation of satellite data.

Sen. Res. Dr. Boytcho Boytchev, Head of the Aerospace Control Systems Department
MS in Electrical Engineering - Technical University of Sofia (1982); PhD in Physics (2003) - Techniques and Instruments for Measurement of Low-Frequency Electromagnetic Fields of Magnetospheric and Litospheric Origin; Head of the Electromagnetic Measurements Laboratory (2007); Head of the Aerospace Control Systems Department (2008); Assoc. Prof. at the Technical University of Sofia, Aeronautics Department (1998-2008); Participated in the development and implementation of instruments for the projects *B-1300, Lyulin, Active, Apex, Compass, Canopus-Vulkan,* and *Resonance*. **Major scientific and applied contributions**: Research articles - 65; Citations - 19; International projects - 8; Implementations - 13; Patents for Inventions: - 9; **Memberships:** Member of the Board of the Bulgarian Astronautical Federation.

Assoc. Prof. Dr. Stavri Stavrev, **Head of the Space Materials and Nanotechnologies Department**
MS in Instrumentation Technology - National Military University of Veliko Turnovo (1965), Second speciality – Applied Physics and Mathematics, PhD in Physics – Thesis in Theoretical Mechanics (1978), Elected Professor in Nanotechnology at the Istanbul Technical University, Turkey (1999). **Major scientific and applied contributions**: Research articles - 160, Citations – 46, International projects – 27 (4 financed by the ESA), Implementations - 7, Inventions – 16, Patents - 11. **Memberships**: HERF Methods, Istanbul Technical University, Turkey, National Nanotechnology Expert Council, MTM, Board of Editors of the *Aerospace Research in Bulgaria* journal.

Sen. Res. Dr. Eugenia Roumenina, Head of the Remote Sensing of the Earth Department
MS in Physical Geography, Hydroclimatology – *St. Kliment Ohridski* University of Sofia, 1976. Working for the Institute since 1976 to present. Planning, organization, and conduct of national and international complex subsatellite experiments and processing the data thereof (1976-2000). PhD in Physical Geography and Landscape Sciences - Land Use and Man-Induced Transformation Monitoring of a Part of the Plovdiv Test Sites Using Multichannel Images and GIS (2002). **Major scientific and applied contributions**: Research articles - 115, Participation in 26 national and international programmes and projects in the field of application of remote sensing methods and GIS in landscape-ecological studies, landscape planning and monitoring of land cover/land use. Training of PhD students and post-graduate specializing students in this field.

Assoc.Prof. Dr. Petar Genov, **Head of the Aerospace Engineering and Technologies Department**
MS Degree in Air-Borne Radio Systems - Bulgarian Air Force Academy of D. Mitropoliya (1964), PhD in Air-Borne Radio Systems – Air Force Engineering Academy, Moscow (1974); Assoc. Prof. - Bulgarian Air Force Academy. D. Mitropoliya (1978); Head of the Air-Borne Radio Systems Dept. - Bulgarian Air Force Academy, D. Mitropoliya (1979); Principal Coordinator of the FREGAT Project for Bulgaria (1986). **Major scientific and applied contributions**: Scientific books – 2, Publications - 90, Projects – 26, Implementations - 23, Inventions – 3.

5. Researchers and other personnel

As of 31.12.2008, the staff of the SRI consists of 125 members including 78 scientists: 4 Senior Researchers I rank (Professors), 15 Senior Researchers II rank, 3 Associate Professors, 33 Research Fellows I rank, 7 Research Fellows II rank, 14 Research Fellows III rank, 3 Doctors of Science, 24 Doctors and 15 Graduates without PhD (ANNEX 6). The young researchers under 35 are 15 (Research Fellows I-III ranks). The SRI pursues a policy of supporting their growth and motivating them to scientific activity. A funding competition for a project under the *Human Resources Development* (HRD) Operational Program of the European Social Fund for 2008-2010 was won as a result. A tendency for increasing the middle age of the personnel with academic ranks is observed – 19 members are over 55. But this is a common event for the BAS due to the slow rise in scientific ranks of the personnel and the outdated Scientific Degrees and Academic Ranks Act (which has not been amended since 1972), placing high and difficult to achieve requirements (ANNEX 7). Special care is taken for the young staff. Young and talented people are trained in Doctor's degree to help their growth and to retain them at the SRI. 28 PhD students, 25 of which are Bulgarians and 3 - foreigners (half of them women) were trained in the period under review. 7 PhD students (5 of them women) presented successfully their PhD Thesis (ANNEX 8).

6. Formal and informal bilateral and multilateral co-operation and relations with other research establishments:

6.1. within the Academy

SRI has active cooperation with the following Institutes from the BAS:

- *Acad. Lubomir Krastanov* Geophysical Institute (GPhI);
- Institute of Astronomy (IA);
- Central Laboratory of Mineralogy and Crystallography (CLMC);
- Institute of Botany with a Botanical Garden (IBBG);
- Institute of Electronics (IE);
- *Acad. Georgi Nadzhakov* Institute of Solid State Physics (ISSP);
- Institute for Metal Science (IMS);
- Institute of Geography (G);
- Institute of Molecular Biology (IMB);
- National Institute of Hydrology and Meteorology (NIHM);
- Institute of Oceanology (IO);
- Central Laboratory of Solar-Terrestrial Influences (STIL);
- Central Laboratory of Higher Geodesy (CLHG);
- Center for National Security and Defence Research (CNSDR);
- Institute of Mechanics (IMeh);
- Institute of Plant Physiology (IPP)..

6.2 at national level

SRI supports active cooperation at national level with the following institutions:

- *St Kliment Ohridsky* University of Sofia;
- Technical University – Sofia;
- *N. Vaptsarov* Naval Academy – Varna;
- Higher School of Transport – Sofia;
- Ministry of Defence;
- Ministry of Emergency Situations;
- Bitova Electronika - Veliko Tarnovo;
- ARCUS Ltd. – Lyaskovets;
- Dendrit Ltd., Sofia;
- Geoproduct Ltd., Asenovgrad;
- Technocontact" Ltd., Rousse;

- Bimeks Ltd., Sofia;
- Nicom Ltd., Varna;
- NANO-SS Ltd., Smolyan;
- STUME – Sofia.

6.3. in Europe and worldwide

SRI participate with 14 projects in the construction of Europe research area and the Balkan region collaboration (ANNEX 1, IV), some of them are:

- SCHEMA - Scenarios for Hazard-Induced Emergencies Management, FP6 – Portugal, Morocco, France, Italy, Alger, Turkey, Great Britain, Greece, and Bulgaria. Coordinator: Richard Guillande, Geosciences Consultants, France;
- Development of Strategy and Methods for Monitoring of Electromagnetic Pollution in the Environment of the Western Balkans. EU Programme, SEE-ERA.NET, INTAS – Slovenia, Croatia, FYR Macedonia and Bulgaria;
- ESINET - European Space Incubators Network;
- OSNET – Realization of Thematic Network on Ornamental Stones. Coordinator: Prof. Dr. Ioanis Paspaliaris, National Technical University in Athens, Greece;
- NAVOBS - A support measure to boost the business prospects of GMES and Telecom satellites through focused and innovative RTD work involving SMEs. Coordinator: Florance Girone, WSL, Belgium, 17 countries;
- NAVOBS+ - Participation of small and Medium-sized enterprises (SME's) in Research and Technology Development (RTD) activities related to the development of innovative services based on space infrastructures, worked parts of EU and ESA;
- SMART WIRE - Co-operative Research Project under the *Craft* Programme;

I-Stone - Re-engineering of natural stone production chain through knowledge based processes, eco-innovation and new organizational paradigms, Coordinator: Prof. Dr. Paspaliaris, Athens, Greece;

- X-Gear - Development of Gear drive-trains based on new materials and novel gear systems, Coordinator: Donato Zangani-D'Appolonia, Italy, 9 countries –23 partners.

SRI has 20 projects in collaborations in Central and Eastern Europe (Annex 1, V) in the frame of Academy's bilateral agreements, 13 of them - on Fundamental Space Research (FSR) with the Russian Academy of Sciences (RAS) for the period 2004-2010, including:
Volna – R; Avrora – R; Resonance; BalkanSat; Shuman; Biodegradation; Greenhouse – Mars; Charge; Accretion; Chaos; Potential Action; Geoecolog; Photocurrent.

The Institute is a partner of the European net for innovative politics (EBN-I).

7. Organization of research process at the unit

The work within the SRI is organized mainly in groups in accordance with the various predefined lines. The research activities of the staff on different project tasks are brought to completion by publishing the results achieved and by taking part in the workshops and conferences organized by the institute. Quality monitoring is performed by the members of the project's technical councils as well as by the Scientific Council of the SRI. Planning and reporting is accomplished on an annual basis. Work progress on the individual contracts is reported as per the relevant plan, under programmmes provided in advance.

8. Participation of the unit in different education activities

Almost all universities in Sofia and all over the country have preference for the SRI scientists and experts as lecturers and tutors in seminars and practical exercises. The experts of the SRI have established many educational programmes and courses on topical scientific subjects in the field of aerospace research, ecology, nanotechnology and more. They are also authors of university textbooks and manuals on these subjects (ANNEX 9).

During the reported period, more than 15 scientists and experts from the SRI-BAS have delivered 1,700 lecture hours in over 10 universities in the country and abroad.

29 MS students from 6 universities (including from foreign ones) have conducted their pre-graduate practice at the SRI-BAS and have been directed in their studies by scientists from the SRI. Scientists from the SRI-BAS have also led specialized training and qualification courses for experts from institutions of national significance, such as the Aerospace Monitoring Centre at the Ministry of Emergency Situations, the Military Academy and more. This activity of the SRI has been rated highly.

9. Services of particular national importance connected to:

A) Operation of national, state and governmental institutions:

A considerable part of the SRI's efforts in the period under review was directed at implementation of projects for the needs of State institutions – ministries, agencies, municipalities etc. Four contracts were signed and performed for the Ministry of Defence (ANNEX 1). Beneficial collaboration was established with the Ministry of Emergency Situations – contracts on four projects were signed and accomplished. Representatives of the SRI-BAS participated successfully in the international drill *Defense against Terrorist Act Consequences Management in South-East Europe - EU TACOM SEE* carried out in the town of Montana in 2006 and hosted by the Rep. of Bulgaria, and the Ministry of Emergency Situations in particular.

B) Different regional contracts with Municipalities in the country (Annex 1, III):

-Updating of dimensions and positions of green areas in the region of Plovdiv Municipality based on photorevision;
-Web-based monitoring investigation of atmospheric pollution in the region of Stara Zagora Municipality on the base of satellite data;
-Pilot investigation of part of the lakes in the territory of Tundja Municipality on the base of satellite and GPS data;
-Pilot ecological monitoring investigation of the region of Kardjali Municipality on the base of satellite and earth-land data;
-Pilot monitoring investigation of the forests and agricultural areas in the territory of *Kardjali* Municipality on the base of satellite and Ground-Based data;
-Pilot web-based monitoring investigation of atmospheric pollution in the region of Bourgas Municipality on the base of satellite and Ground-Based data.

10. Overall academic achievements or reputation of the research unit illustrated by all data for the period 2004-2008 with special stress on:

10.1. Project activity

During the reported period (2004-2008), the SRI-BAS took part in a total of 119 projects (ANNEX 1).

These projects may be classified as follows:

- 30 - funded only by the budget subsidy of the BAS;
- 20 - additionally funded by contracts with the National Science Fund (NSF);
- 12 - additionally funded by contracts with ministries, organizations and private companies from the country;
- 14 - additionally funded by contracts and programmes of the EU, NATO, UNESCO and other international organizations;
- 23 - funded under the Academy's bilateral agreements and in the framework of institute-to-institute cooperation;
- 20 - assigned by outsourcers, including State or private companies from the country or abroad.

Table of receipts from different sources for the period 2004–2008

Sources of finance [BGN]	2004	2005	2006	2007	2008	Total
Budget subsidy	**810,492**	**923,100**	**909,740**	**985,576**	**1,164,200**	**4,793,108**
Scientific–applied international projects	39,530	265,716	137,036	73,604	186,947	**702,833**
Programme PHARE and OP HRD					96,526	**96,526**
Scientific–applied projects in the country	388,627	373,782	340,711	469,716	209,903	**1,782,739**
Research projects from the FSR		9,300	19,000	78,438	213,600	**320,338**
Rental receipts	21,579	19,555	17,541	25,399	34,036	**118,110**
Total funds from contracts of the SRI-BAS	**449,736**	**668,353**	**514,288**	**647,157**	**741,012**	**3,020,546**

During the reported period, the budget subsidy increased gradually as a result of the increase of the average work salary and the social security benefits in the country, approved by the annual budget of the Republic of Bulgaria, and the increase of expenditure for consumables.
No receipts have been reported under international projects, because no stages have been reported to the European Commission yet.
During the reported period, the funds from National Scientific Fund (NSF) – MoES have increased as well. Only in 2008 there were 10 projects funded by the NSF.
The total receipts from additional contracts of the SRI-BAS constitute about 70% of the budget subsidy.

10.2. The publication activity of the SRI during the reported period is pretty good (Annex 2), as may be seen from the table shown below.

Publications of the research staff of SRI-BAS for the period 2004–2008

Number of papers published	2004	2005	2006	2007	2008	Total by type
2.1.1. In science journals abroad	11	11	19	22	12	75
2.1.2. In science journals in Bulgaria	27	25	17	13	26	108
2.2.1. In full text in congresses and symposia proceedings abroad	14	22	12	11	14	73
2.2.2. In full text in congresses and symposia proceedings in Bulgaria	63	115	80	26	106	390
2.3.1. Scientific books published abroad			1			1
2.3.2. Scientific books published in Bulgaria	2	1	1	3	2	9
Total by year	**117**	**174**	**130**	**75**	**160**	**656**

For 20 years already, the SRI has been issuing the scientific journal *Aerospace Research in Bulgaria*, which is funded entirely by the Institute. The journal is peer-reviewed by prominent scientists from the BAS and other external research institutions and is published in English. With its history of 22 printed issues, it is gaining increasing popularity among the scientific community in the country and abroad. A total of 17 scientists from the Institute participate in its and other Editorial Boards (ANNEX 12). Apart from the journal, the Institute publishes proceedings from the scientific events commemorating important anniversaries and from the traditional annual scientific conference with international participation *Space, Ecology, Nanotechnology, Safety – SENS*, which took place in Varna over the period 2005–2008.

10.3. Expert activity of the scientists from the SRI (ANNEX 10)

During the reported period, **15 persons** from the SRI-BAS participated in **international** councils, commissions and other expert bodies (governmental and non-governmental), foundations, organizations, publishing houses and others (**17 bodies); 5 persons** participated in **national** councils, commissions and other expert bodies (governmental and non-governmental), foundations, organizations, publishing houses and others (**11 bodies); 5 persons** have submitted in writing concepts, programmes, forecasts, expert appraisals, opinions, consultations, reviews (incl. for scientific ranks and title) and the like (**17 materials).** Or, on the overall, the SRI-BAS has a total of **17 experts** participating in **25 internal and external bodies** with **16 submitted written materials**.

10.4. International activity of the scientists from the SRI (ANNEX 11)

During the reported period, scientists/scholars from the SRI-BAS have carried out **36 international projects in the framework of the Academy's bilateral agreements** (of them with: Czech Republic – 5; France – 3; Greece– 1; Hungary – 3; Macedonia – 1; Norway – 1; Russia – 18, Ukraine – 3), using a **total quota of 419 days.** The visits abroad for participating in **scientific events (congresses, conferences and etc.)** amount to **29 visited countries** with **106 scientists from the SRI.** On the other side, the **number of foreign scientists who have visited the SRI-BAS** amounts to **a total of 166 persons**, of them: **159 on short-term visits, and 7 – on long-term** (more than 2 weeks) ones. The number of scientists sent on: **study stays** amounts to **13** (21 study visits); **long term visits for research or lecturing - 3** (5 study visits); employees **on permitted unpaid leave abroad as of December 31, 2008 – 1**; visits abroad on organizational or administrative mission – **7** (5 missions).

10. 5. A) up to five most important scientific achievements

1. Energy deposition into ionospheric cusp region using the first magnetically conjugated ionospheric (EISCAT, MIRACLE) and high-altitude (Cluster) observations. Showed that the particles seen at about 9 Re in the exterior cusp carry an earthward energy flux that corresponds to the observed heating of the F-region. The earthward Poynting flux is more than enough to account for the Joule heating in the E-region. These results are published in Geophysical Research Letters.
2. Investigation of the quasi-static electric field anomalies in the upper ionosphere associated with the seismic activity during August–September 1981 by use of the *in situ* data from the INTERCOSMOS-BULGARIA-1300 satellite. Showed that ionospheric anomalies, as phenomena accompanying the seismogenic processes, could be considered eventually as possible pre-, co- and post- earthquake effects. A case study of the giant Sumatra earthquake, using DEMETER and DMSP data has shown an increase in H^+/O^+ ratio in the topside ionosphere prior to and after five events preceding the main shock. The results are published in Advances in Space Research and Natural Hazards in Earth System Science.
3. Study of the impact of environmental parameters on the growth and development of higher plants, simulating space conditions. Development of new key systems for a third

generation space greenhouse: for light diode illumination, for monitoring of the leaf area, and for automatic maintenance of preset climatic conditions (temperature, air humidity, and CO_2 content) in a closed chamber.

4. Study of the processes and phenomena related with the change in the electric potential of the modules on-board the International Space Station. A flight set of the DP instrument has been produced, which passed successfully all acceptance tests.
5. Analysis of the X-ray spectra obtained by data from NASA's Chandra Observatory was completed. The temperature distribution of the hot plasma amount responsible for the formation of the examined objects' X-ray emission was obtained. New data about the 'born' residue of the super-nova Large Magellanic Cloud SN1987A was obtained. The performed preliminary analysis confirms the basic model of X-ray emission formation as a result of gas heating in shock waves.

10.5. B) up to five most important applied results and/or realizations

1. Project for a National Telemedicine System. The system will be targeted at the mass consumers and will provide comprehensive information on the recorded vital signs. The project was adopted as a pilot project of the TTO at the SRI under the PHARE Programme; it was reported and defended before experts in the field. Techniques and instrumentation for recording of physiological signals were developed and tested, complying with the project's specific. A number of concrete instrument versions are available, which may be used as a basis for the System's Personal Diagnostic Instrument.
2. In the field of Remote Sensing, new techniques and equipment for studying natural processes and ecological risk were designed and protected by patents. A national geodatabase was created based on NDVI imagery from NASA's satellite NOAA-AVHRR, as well as phenological data derived from the observational network of the NIMH-BAS for 1997–2008. A methodology for monitoring of vegetation cover was developed and tested for the territory of the Rep. of Bulgaria. As a deliverable, a series of assessment maps for 2008 were produced based on referent images. The developed geodatabase and methodology were transferred to the AMC at the the MoES. Strategy and Method for Monitoring of Electromagnetic Pollution in the Environment of the Western Balkans were developed (SEE –ERA.NET Pilot Joint Call).
3. A national system entitled *Ground-Based Identification "Friend or Foe" Systems* complying with NATO's requirements was developed. The developed devices were adopted for use by the Bulgarian Air Force in the recent years.
4. A new self-lubricating composite material of the IPM class was developed, with built-in structural MoS_2. The friction surface of the material features highly heterogeneous structure and optimized phase composition. It boasts greatly improved antifriction properties at dry friction in high vacuum, which makes it fit for continuous and reliable operation in space conditions. The material is suitable for ground-based use as well, since the toxic solid lead component has been avoided, thereby achieving great ecological effect.
5. A technological solution was found to replace carcinogenic cobalt in the production of stone-cutting segments made of composite material based on tin and ultra disperse diamond powder. The segments synthesized after this technology feature a threefold greater cutting speed (60 m/s) compared to the conventional details.

10.5. C) total number of citations appeared in the period 2004-2008 - more than **270.**

Critical assessment

The Space Research Institute features optimized staff and two-level management system (Departments and Executive Body). The staff is experienced and qualified but the number of young people should increase. The funding should almost entirely be provided by projects,

which will make it possible to increase the existing remuneration and recruit younger employees. The subjects of the PhD Theses should be bound with the scientific problems and tasks resolved under the various projects awarded by competitions, which will guarantee the PhD Students' team work and will provide funds for buying scientific equipment and participation in conferences, symposia, and qualification enhancement courses. The bilateral contacts of the Institute should improve, finding more foreign partners for joint participation under the European Programmes, and the obtained results should be disseminated on a larger scale, both among the scientific and business community and the political figures. Currently, no funds are available for updating of the existing equipment and enhancement of the scientists' qualification. ESA membership is a must for beneficial collaboration with other European countries in the research field. The publishing activity cannot develop further with the scarce funding provided for participation in congresses, conferences, and other scientific forums. The problem with providing the required funds to publish in reputable journals and other printed issues demanding significant fees, is still pending which accounts for the relatively small number of citations. Notwithstanding these financial restrictions, the publishing of the *Aerospace Research in Bulgaria* Journal is funded entirely by the Institute and the annual conference with international participation *Space, Ecology, Nanotechnology, Safety - SENS*, is also funded entirely by the SRI. Improvement of the relations with the business community necessitates improvement of the public-private partnership terms. The moratorium on the establishment of various types of companies should be removed and the problem with the ownership within the Academy should be resolved.

II. Strategy and policies for future development

1. **Envisaged development** of research subjects and plans in the short and long term

Internationally, the main strategic goal of the scientists from the Space Research Institute (SRI) is to become member of the European Space Agency (ESA). This is quite logical, taking into account that the majority of projects under EU FP7 in the fields of Environment and Climate, Transportation, Agriculture and Food Resources, Security and Space will be run jointly by the ESA, which is assigned the task to develop a European space segment and invest in specific space programmes of crucial importance for the whole of Europe. The role of ESA and Space, as a decisive factor in resolving current challenges, is determined by the decisions of the two meetings of Ministers of the EU and ESA in 2008 (Kuru 24-26.07.2008 and 26-27.11.2008 Hague). Accounting for this and for the fact that in the future Bulgaria will emphasize on the development of applied research directly related to our country's problems and opportunities, our participation in ESA is becoming an objective of primary importance. This can be seen from the projects and tasks included by the Space Research Institute in the National Space Research Program (NSRP), proposed to the government. At the initiative of the SRI, the Interinstititional Committee on Space Research at the Council of Ministers held a preparatory meeting to raise the awareness of Bulgarian state institutions and researchers interested in ESA membership (14-16.02.2007). At these meetings, the representative delegation of the Agency was acquainted with the successful results of the Bulgarian Space community and Bulgaria's intention to join ESA's Plan for European Cooperation State (PECS).

The recently adopted political decision to start negotiations for Bulgaria's joining the PECS Programme and the adoption of the National Space Research Programme will provide for Bulgaria's joining the European plans. The five-year National Space Program Research will ensure funding of the SRI's participation in PECS and consolidation of space science in Bulgaria by implementing two major projects of the program:

I. Association of the Republic of Bulgaria to the European Space Agency and its participation in research projects.

II. Establishment of a National Monitoring System including the airspace segment and the terrestrial infrastructure program (Global System for Environment and Security) GMES EU and ESA.

This and the new challenges faced by the European space community, namely:

- Use of Space for solving the problems of climate change;
- Use of Space for solving the problems of anthropological security;
- Use of Space as a catalyst for solving the problems of the Lisbon Strategy, mark **the future plans of the scientists of the SRI.**

The scientists from the **Space Physics** Department plan forthcoming research activities based on their 40-year experience in the field of near-Earth space exploration:

- Plasma turbulence and energy transfer across transition regions in the Earth magnetosphere (POLAR, CLUSTER, INTERBALL, EISCAT, CHAMP);
- Troposphere-lower atmosphere-ionosphere interaction processes in the context of global climate understanding (DMSP, DEMETER, future EOARD project);
- Natural hazard's effects on the Earth's ionosphere, electromagnetic emissions and ionospheric perturbations associated with anthropogenic activity (DEMETER, DMSP);
- Further development of new algorithms and information technologies of data processing, data transfer and storage and data interpretation.
- Plasma and wave environment of large body in space by *in situ* diagnostics (International Space Station - Russian segment);

- Spin-off technologies and sensors developed in the Space Physics Dept. (vitreous carbon electric field sensors, materials and samples);

The **Astrophysics and Synergetics** Department is going to focus its forthcoming research on the following areas:

- Investigating the dynamics and structure of accretion flows and their stability;
- Shock waves occurring as a result of inflowing or outflowing nonstationary fluxes;
- Self organisation obtained as a result of feed back between accreting substance emissivity flux from the inner edge of the disc on the equatorial plane;
- Defined current structures originating from Rossby type solutions;
- Various types of instabilities which modulate the observed manifestation of such phenomena.

The major research subjects with which the **Remote Sensing of the Earth** Department has been traditionally involved and which will continue to be developed in the long run are:

- Design and development of Remote Sensing of the Earth techniques, equipment and technologies*;*
- Environmental monitoring with integrated use of Remote Sensing of the Earth technologies, Geographic Information Systems and conventional ground-based methods;
- Multi-risk analysis of natural and natural disasters, accidents and catastrophes;
- Development of a scientific-information complex for aerospace test sites on the territory of the Republic of Bulgaria;

The **Aerospace Information Center** future aims are:

- Receiving, processing and collection of aerospace data for monitoring of environment and security;
- Development of Hi-Tech for design and creation of micro-satellite system for investigation and monitoring of environment;
- Design and creation of ground stations for receiving and control of data from micro-satellite system.

The **Space Biotechnologies** Department's future activity will be directed towards creation of a new generation of SVET-3 Space Greenhouse and search for funding opportunities and partners from the European Union for joint projects to continue the microgravity plant experiments onboard the International Space Station. Based on the rich history of the Department's beneficial international space projects (25 years), we continue the collaboration with the IMBP, Moscow, directed to the creation of Biological Life Support System for future manned space mission to Mars. Light systems based on RGB power LEDs are being developed on the *Greenhouse-Mars* Project (2006-2010) to be used for bio-medical research during the 500-day ground MARS-500 experiment with 6 volunteers starting in 2010.

The **Aerospace Engineering and Technology** Department future activities are directed to:

- Research in the field of computer control systems with aerospace application and formal methods of software development;
- Investigations for creating and transferring of aerospace techniques and technologies in the field systems for control and diagnostics of psycho-physiological state of the person in extreme conditions;
- Non-standard equipment for aerospace application; chaotic process in non-linear and parametric systems.

The **Aerospace Control Systems** Department is going to consolidate its forthcoming research in the following areas:

- Development of the BalkanSat micro-satellite by means of expanding its collaboration with other Balkan countries, the GMES European programmme;

- The specified areas include development of a micro-satellite platform as well as the corresponding on-board systems;
- Development of apparatus to measure in electro-magnetic manner electric fields within wide frequency range in order to carry out on-board and ground-based experiments.

The **Space Materials Science and Nanotechnologies** Department future aims are:
- Semi-industrial production with modification for the research works on the Framework Programs of the EU and the National Scientific Fund;
- Development of new methods for nanostructure disaggregation;
- Extension of nano-medicine studies: fight against cancer; osteoporosis treatment; gamma medicine immobilizers; increase of the project investigations connected with NATO and EU countries security;

To solve these tasks, it plans:
- to enlarge department participation in EC Framework Programs;
- to strengthen the interdisciplinary co-operations within Academy and with the universities working under the Scientific Research Fund of the Ministry of Education and Science;
- to continue the memberships in EU networks and plans to create new one.
- to extend its cooperation beyond the European boundaries, aimed at Russia and USA.

2.Actual personnel policy

Taking into consideration Annexes 6, 7, 8, the following conclusions could be made:

I. The staff of the Institute is ageing

This requires urgent measures to prevent such tendency:
- First of all, raising the remuneration in the SRI;
- Establishment of differentiated payment system consisting of fixed and variable part which are formed from the State budget and from the SRI's own income;
- Encouraging the qualification of the young specialists through activities like young researcher's schools and courses based on international networks, organized under framework programs and scientific projects;
- Raising the social status of the specialists by offering stimulating incentives, accommodation and recreation facilities;
- Establishing of practice to train specialists – scholarship students from the Institute based on a prospective career development policy of the Institute.

II. The scientists' career development is not optimized
- The existing Act on Scientific Degrees and Academic Ranks is outdated and does not enhance scientists' specialization and development;
- The multistage procedure of awarding scientific degrees and academic ranks is administered by a centralized authority – The Higher Testimonial Committee which impedes career development and does not comply with the European laws and practices.

III. The provision of modern infrastructure and equipment is also seriously impeded;
- The outdated infrastructure and equipment does not attract new research and young people and needs urgent updating in order to keep young people in science;
- Introduction of new research approaches, availing of the potentials offered by the country's membership in EU and NATO and their activities to keep young people in science.

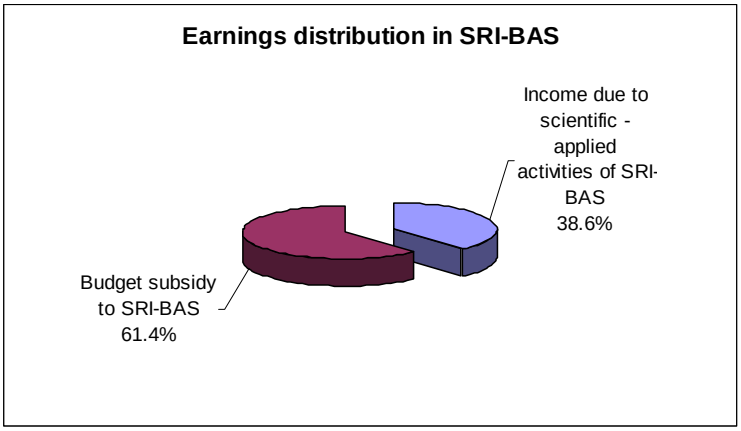
The personal development policy to Year 2015 includes plans for awarding an average of 20 PhD degrees, which will result in decreasing the average age of the researchers of the SRI. The future policy will be also aimed at employing young people (under the age of 35).

3.Financial situation.

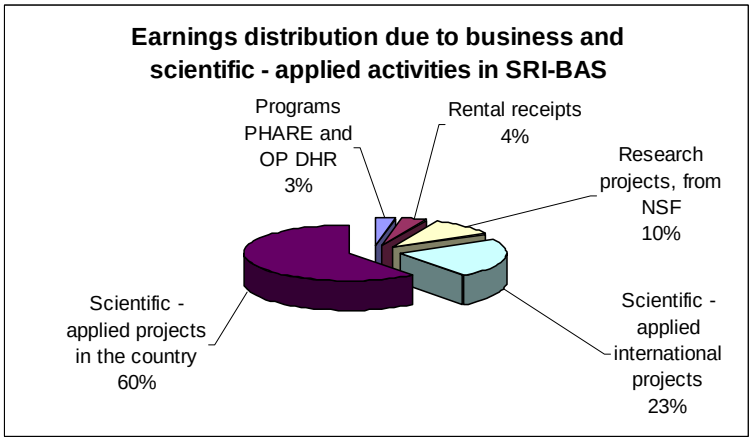
Sources of finance:

Budget subsidy – The budget provided by the State is extremely insufficient mainly for procurement of scientific equipment, software products and consumables. It is not sufficient to provide adequate payment to Research Fellows which makes it hard to recruit young researchers.

Additional sources – During the reported period, the SRI-BAS has worked on a total of 119 проекта, 53 of which were funded by the BAS (ANNEX 1, point I and IV), while the other 66 projects generated income in excess of BGN 3 million, which is nearly 40% of the total income of the SRI. The ratio of the budget subsidy and the SRI's own income is shown on the Table presented above in point I.10.1, and is also shown on the diagram below:



The structure of the SRI's own income is shown on the diagram below:



The international cooperation in space research is impeded by the fact that the country is not member of the ESA.

The participation of the Institute in competitions is obstructed by the lack of appropriate licenses complying with the European standards, which is mainly due to the lacking finance for their procurement.

The private sector in the country is still not interested in investing in scientific projects and technologies, because it is just starting functioning and there is no clearly defined national policy in this direction.

Winning competitions under framework programmes is still occasional, therefore, which requires efforts to increase scientists' interest in this field.

The presented data shows that, if the tax and social security withholdings are accounted for, the budget subsidy is commensurable with the Institute's own incomes.

The SRI financial plans for the period to Year 2015 are as follows:

- budget – 40%;
- EU programme projects and MoES – 40%;
- business projects – 20%.

The sources for this purpose will be up-to date funds; contracts for the development of Small and Medium Enterprises (SME's) implementation projects; development of pilot production in the SRI with SME's collaboration for working up the technologies.

4. Critical assessment of the current structure

The above-described structure of the SRI was adopted in the end of 2008 and reflects the current status. It comprises 8 Departments working in the three above-mentioned fields. The administrative units are reduced to the possible minimum to optimize the SRI staff.

In the end of 2008, a new executive body of the SRI and a new Scientific Council were adopted. The SRI's structure was updated, which was achieved by agglomeration of the available departments to enhance the scientific R&D activity and the SRI's participation in competitions organized by the EU and the NATO.

The future policy will be associated with decreasing the number of scientific themes and scientific structural units in order to strength the researchers' teams in 3 priority and prospective lines, which receive pretty good current funding, such as: Remote Sensing of the Earth, Space Materials Science and Nanotechnology, and Aerospace Systems and Technologies, which will maintain the theoretical and experimental fundamental research in Space Physics, Astrophysics & Synergetics and Space Biotechnologies.

The Departments and the SRI will soon assume a new up-to-dare structure intended for working with the business, establishing a business-incubator with industrial participation.

5. Innovation potential of the research unit

The Institute's general activity is targeted at serious innovations and implementations as may be seen from ANNEX 3, 4, 5:

The SRI patent and innovation activity could be assessed as very productive.

As result of scientific and scientific- applied activities on different projects during current period in SRI are created **14 new products ready to be implemented in industry** (ANNEX 3). Some of them 3 pcs (position 2) are already instilled in industry.

In the period under review, the scientists and experts from SRI have applied for **20 patents for inventions and useful models**. 15 of them were approved - some received patent rights and other are waiting for fee payment. Another 5 applied patents are being considered and most of them are likely to get a positive resolution. The SRI's scientists have been awarded patents in the USA, Russia, Ukraine, etc.

Some of the patents have been awarded medals and honorary diplomas on a number of prestigious international and national innovative and inventive forums. The governing body of SRI has been doing all they can to stimulate and give the inventive activity countenance and financial support. Problems concerning all (not only the SRI) are the long lasting procedures of patent consideration and the increasingly raising patent fees.

SRI has subsidiary scientific-industrial enterprise in Stara Zagora: NPO Kosmos Ltd.

The Institute's applied units should use effectively the **Technology Transfer Office** (TTO) established under the PHARE Programme to increase the effectiveness of their work and to shorten the time needed for implementation of the Institute's own and other institutions' innovations.

The fundamental-to-applied research ratio is about 30% to 70% and the SRI intends to keep this proportion in the future while reorganizing the Institute's work based on contract and team principles.

6. Short view of the perspectives

By a Resolution of the Interinstitutional Committee on Space Research at the Council of Ministers of the Rep. of Bulgaria, the SRI-BAS was assigned the task to examine the prospects for Bulgaria's inclusion in the ESA's Plan for European Cooperation State (PECS) and proposed to the Government a five-year project-based National Space Research Programme (NSRP).

The NSRP was prepared by the Bulgarian Academy of Sciences and adopted by the Interinstitutional Committee on Space Research of the Council of Ministers.

The adoption of the National program for space research and the activities in its implementation will contribute to:

- inclusion of the Republic of Bulgaria in the five-year program of the European Space Agency - Plan for European Cooperation State (PECS), created specifically for the new Member States of the European Union and consistent with their economic condition;
- creation of a national space segment on the basis of micro-satellites platforms and construction of the terrestrial infrastructure system - Global Monitoring for Environment and Security (GMES);
- creating opportunities for participation of Bulgaria with the national high-tech developments in current and future projects of the European Space Agency and the 7th Framework Program of the European Commission;
- initiation of new national research programs and projects and developing the required apparatus system resources for its implementation;
- creating opportunities for rapid technology transfer of space methods, equipment, data, results and technologies in various fields of economy and practice and the needs of businesses, including SMEs;
- providing access to a wide range of users to data and results from space programs and research;
- establishing the National Space Geo-Information Center in an integrated information system for GMES data reception, processing and dissemination of information to interested agencies, institutions, businesses, local authorities and others.

ANNEX 1

SCIENTIFIC PROJECTS IN THE PERIOD 2004 - 2008

N	TITLE OF THE PROJECT	PRINCIPAL INVESTIGATOR Partner organization or coordinator, number of participants from the unit and from other BAS units, number of PhD students	FUNDING provided by /institution, reg. № or code of the project/contract, etc./	RECEIVED FUNDING BY THE UNIT in BGN, or EUR, or USD	Relevance to industry and the economy /area of application/
1	2	3	4	5	6
I. Projects, funded only by the budget subsidy of BAS					
1	Development of Biotechnology and Modelling of Space Greenhouse Systems	Sen. Res. Dr. Tania Ivanova, 9 participants 1 PhD student	Budget subsidy of BAS		Agriculture-greenhouse industry
2	Study of New Materials and Coatings for Operation in High Vacuum for Space Applications, 2004 - 2008	Prof. Dr.Yulika Simeonova, 3 participants - 1 PhD student	Budget subsidy of BAS		New materials
3	Creation of Optic Electronic Systems on the Base of CCD Technology and Processing of Aerospace Information	Res. Fell. Hristo Lukarsky 11 participants	Budget subsidy of BAS		Space Application
4	Optimization of the Models of Correlation of Geometrical Distortion of Aerospace Images with Very High Resolution, Using GPS Data	Sen. Res. Dr. Roumen Nedkov, 12 participants, 1 PhD student	Budget subsidy of BAS		Space Application
5	Formal Methods and Dynamical Reconfiguration in Computer Systems for Management and Modelling in Real Time with Aerospace Implementation	Res. Fell. Plamen Hristov 6 participants, 1 PhD student	Budget subsidy of BAS		Possibility for creation of software with high reliability and flexibility for autonomous control/information systems and real-time simulation systems

6	Nonlinear Evolution of Astrophysical Disks	Sen. Res. Dr. Lachezar Filipov, 6 participants, 2 PhD students	Budget subsidy of BAS		
7	Physics of Shock Waves in Astrophysical Objects	Sen. Res. Dr. Lachezar Filipov 1 participant	Budget subsidy of BAS		Science
8	Methods and Means for Measurement, Control and Analysis of Physiological Signals in Extreme Conditions	Assoc. Prof. Dr. Petar Genov, 6 participants	Budget subsidy of BAS		Space Medicine Sport
9	Investigation of Shock-Wave Propagation in Solids and Powders	Res. Fell. Valentin Gospodinov	Budget subsidy of BAS	-	Industry
10	Electric Field Effects on the Electronic States in Graded Composition Quantum Wells and Superlattices	Res. Fell. Adelina Miteva	Budget subsidy of BAS	-	In various semiconductor electronic and optho-electronic devices
11	Study of Anomalous Effects in the Ionosphere Registered on board of the *Intercosmos- Bulgaria-1300* Satellite over Seismically Active Regions	Res. Fell. Mariana Gousheva 7 participants, 3 from STIL-BAS, 1 from the Geological Institute-BAS, 1 from the Geophysical Institute-BAS	Budget subsidy of BAS		Extensive damage to the physical infrastructure and losses to the regional and national economies.
12	A Study of the Polar Cap Potential Distribution as a Result of Interplanetary Magnetic Field Fluctuations	Res. Fell. Ludmil Bankov 2 participants	Budget subsidy of BAS		Ecology
13	Experimental Study of the Ionospheric Effects over Seismically Active Regions by Means of Coordinated Ground Based, DEMETER and DMSP Satellite Data	Res. Fell. Ludmil Bankov 2 participants	Budget subsidy of BAS		Space Application
14	Project *Charge-ISS*	Sen.Res Dr.Georgi Stanev, 4 participants	Budget subsidy of BAS		Space Application

15	Creation of Data Base for Physical Parameters and Corresponding Geophysical Information from *ICB-1300*	Res. Fell. Nikolai Bankov 3 participants	Budget subsidy of BAS		Space Application
16	Methods for Investigation of the Ionosphere: Photocurrent and its Influence on the Potential Based on the *ICB-1300*	Sen. Res. Dr. Stefan Chapkunov, 3 participants	Budget subsidy of BAS		Space Application
17	A study the ELF/ULF Waves in the Earth's Magnetosphere	Sen. Res. Dr. Dimitar Teodosiev, SRI-BAS, 2 participants	Budget subsidy of BAS		Space Weather
18	Development of a GIS for Landscape-Ecological Planning Using Aerial and Satellite Images	Sen. Res. Dr. Eugenia Roumenina, 10 participants 1 PhD students	Budget subsidy of BAS		Landscape Planning and GIS Data Base
19	Using Cartographic and Space Methods for High-Accuracy Georeference and Rectification if Geometric Deformations in Remotely Sensed Images. Construction of a Data Base for GIS.	Prof. Nikola Georgiev, DSc in Physics and Maths 10 participants 1 participant from the Central Laboratory of Higher Geodesy	Budget subsidy of BAS		GIS Data Base
20	Study of the Nature of Bulgaria (by Aerospace and Ground-Based Data)	Prof. Hernani Spiridonov, DSc in Geology 10 participants 1 participant from the Institute of Geography 2 PhD students	Budget subsidy of BAS		Environment
21	Geoecological Studies and Study of Natural and Risk Processes	Prof. Hernani Spiridonov, DSc in Geology 12 participants 1 participant from the Institute of Geography 1 PhD student	Budget subsidy of BAS		Environment
22	Studies Related with Integrating GPS and Loran-C for the Purpose of Determining the Lateral Location and for Navigation Georeference	Prof. Nikola Georgiev, DSc in Physics and Maths 10 participants 1 participant from the Central Laboratory of Higher Geodesy	Budget subsidy of BAS		Navigation

23	Remote Sensing Aerospace and Contact Ground-Based Techniques and Instrumentation for Studying Natural Processes and Ecological Risk	Prof. Garo Mardirossian, DSc in Engineering 7 participants 1 PhD student	Budget subsidy of BAS		Environment
24	Development of Techniques and Instrumentation for Studying Total Atmospheric Ozone Content	Sen. Res. Zhivko Zhekov, DSc in Engineering 5 participants	Budget subsidy of BAS		Environment
25	Preliminary Preprocessing of Videospectrometric Data	Sen. Res. Dr. Valentin Atanassov, 4 participants	Budget subsidy of BAS		Ecology
26	Anomalies in Cosmological, Global, and Biological Times and Multitemporal Hazards for the Sustainable Development of Earth and Life	Res. Fell. Dr. Zdravko Andonov	Budget subsidy of BAS		Fundamental Science
27	Specialized Electromagnetically Complexes for Investigation of Ion Spherical-Magnitospherical Plasma and Lit Spherical Phenomena	Sen. Res. Dr. Boycho Boychev 4 participants	Budget subsidy of BAS		Space Application
28	Carrying out a Scientific Research Intended to Develop Methods, Algorithms, and Program Facilities to Investigate an Operator of a Complex Technical System	Sen. Res. Dr. William Popov, Res. Fell. Zoya Hubenova 4 participants 1 PhD student	Budget subsidy of BAS		Transport
29	Mathematical Modelling Flights of Air Vehicles and Satellites	Prof. Dr. Petar Getsov, Assoc. Prof. Dr. Dimitar Jordanov 4 participants, 1 PhD student	Budget subsidy of BAS		Transport
30	A Study of the Characteristics of New Composite Ceramic Materials Based on Vitreous Carbon.	Sen. Res. Dr. Dimitar Teodosiev, 2 participants.	Budget subsidy of BAS		Medicine
II. Projects, additionally funded by contracts with the National Science Fund /NSF/					
1.	Development of a New Space Greenhouse Control System. Experimental Verification of Mathematical Models of Transport Processes in Substrate Media	Sen. Res. Dr. Tania Ivanova, 9 participants – 1 PhD student Partners from Institute of Mechanics – BAS 5 participants – 1 PhD student Institut Liof. Techn. – 5 particip.	NSP *Space Research* KI-1-01/03 (2004-2007г.) KI-1-02/03	Total BGN 76,000 SRI BGN 30,000	Agriculture-greenhouse industry

2	Research of Regular and Nonregular (Chaotic) Processes in Nonlinear and Parametric Dynamical Systems	Res. Fell. Kostadin Sheiretsky 4 participants, 2 PhD students	H3-1106/2001	BGN 2,200	Theoretical Study
3	Scietific Problems in Nonlinear Dynamics and Chaos Around Extraterrestrial Space and Solar System	Res. Fell. Kostadin Sheiretsky 6 participants	H3-1506/2006	BGN 3,000	Theoretical Study
4	Project *Synthesis, Properties and Application of New Materials, Based on Ultradispersed Nanodiamond*	Assoc. Prof. Dr. Stavri Stavrev, 6 participants Partners: 6 experts from the Inst.of General and Inorganic Chemistry 4 experts from UCTM, Sofia, 1 PhD student	HT3-01/2004	BGN 9,600	Industry
5	Project *New Biodegradable Nanostructured Materials, Expediting Osteogenesis*	Leader M. Apostolova, Institute of Molecular Biology Assoc.Prof. Dr. Stavri Stavrev, SRI-BAS	HTK-X-1704/07	Total: BGN 120,000 SRI – BGN 42,000	Medicine
6	Project *Investigation of Nanomodified Metal Alloys and Their Application in Casting*	Sen. Res. V. Manolov, IMS–BAS, Assoc. Prof. Dr. Stavri Stavrev	311/19.12.08	Total: BGN 280,000 SRI – BGN 56,000	Industry
7	Creation of Data Base for Physical Parameters and Corresponding Geophysical Information from *ICB-1300*	Prof. Mikhail Kaschiev, DSc – Institute of Mathematics – BAS 4 participants SRI-BAS -3 participants	NSF PROJECT H3-1309/03	BGN 6,800	Applied Research
8	A Study of ELF/ULF Waves and Field-Aligned Current Systems by Satellite And Ground-Based Measurements	Sen. Res. Dr. Dimitar Teodosiev, SRI-BAS, 1 – ISTI-BAS, 1 – GphI-BAS, 1 PhD student	ES - 1502/2005 (2005-2009)	BGN 26,600	Applied Research-Space Weather
9	New Methods for Producing of Carbides of Refractory Metals (B, W And Ti)	Dr. St. Gyurov – IMS-BAS – 5 persons, Sen.Res Dr. Dimitar Teodosiev - SRI-BAS	TS-1529/2005	Total: BGN 20,000 For SRI- BGN 700	Industry

10	Development and Research for New Composite Biocompatible Ceramic Material, with Nano-Carbon Coating Intended for Endoprothesis.	Sen. Res. Dr. Dimitar Teodosiev 15 participants, SRI-BAS - 5 (2 PhD), TU – 8, IOCh-BAS – 4, IMS-BAS – 8.	D02-234/17.12.2008 (2008-2011)	Total: BGN 330,000 For SRI-BGN 204,000	Medicine
11	Synthetic Nanoporous Carbon from Biomass and Coal Treatment Products.	Dr. N. Petrov – IOCh-BAS – 5 participants, SRI-BAS – Sen. Res. Dr. Dimitar Teodosiev, IMS-BAS – 1, ChTU– Bourgas–2	D02-222/17.12.2008 (2008-2011)	For SRI-BAS BGN 40,000	Ecology
12	Complex Capitalization of Titanium Waste by Hydrogen Treatment to Obtain Titanium Powder of Nanometric Dimensions	Dr. J. Lukarski - IMS-BAS -8, SRI-BAS – Sen.Res.Dr.Dimitar Teodosiev.	BR-11/ 18.12.2007 (2007-2009)	For SRI-BAS BGN 1,000	Industry
13	Geomorphologic and Stratigraphic Studies of the Quaternary in North Bulgaria (by groun-based and remotely sensed data).	Prof. Hernani Spiridonov, DSc in Geology 7 participants 2 PhD students	906/15.04.99	BGN 2,500	Environment
14	Synthesis of Algorithms for Imaging Spectrometer Module Characterisation	Sen. Res. Dr. Valentin Atanassov 5 participants	I-1206/02	BGN 2,000	Applied Research
15	Establishment of a Scientific-Information Complex for Aerospace Test Grounds on the Territory of the Republic of Bulgaria	Sen.Res. Dr. Eugenia Roumenina 19 participants 4 participants from the National Institute of Hydrology and Meteorology (NIHM) 5 PhD students	NIC-003/07 SRI-BAS	Total BGN 45,000 SRI BGN 12,460	Training of experts
16	Development of the Methodical Fundamentals of Landscape-Ecological Planning Using Geoinformation Technologies	Sen.Res. Dr. Eugenia Roumenina 13 participants 1 participant from the Institute of Geography 1 participant from the Institute of Botany with a Botanical Garden 1 participant from the National Natural History Museum	NZ-1507/05	BGN 19,400	Performing of Landscape Planing

17	Geoecological Investigation of Natural Hazards and Integral Risk Assessment for the Needs of Regional Planning	Prof. Hernani Spiridonov, DSc 9 participants 1 participant from the Institute of Geography 3 foreign participants	NZ-1514	BGN 13,500	Performing of expert evaluation
18	Physicogeographic Study of the Environment in the Basin of the Mesta River by Analysis of Remote Sensing and Ground-Based Information	Res. Fell. Aleksandar Gikov 2 participants 1 participant from the Institute of Geography 1 participant from the South-West University of Blagoevgrad	МУ-NZ-1202	BGN 7,000	Performing of expert evaluation
19	Electromagnetic Monitoring of Areas with Intensified Seismic Activity.	Sen. Res. Dr. Boycho Boychev, 7 participants SRI-BAS- 4 participants GPhiI- BAS- 3 participants	MoES	BGN 11,800	Environment and Ecology
20	Establishment CCD-Based Technologies of Optical Systems and Processing the Airspace Information	Res. Fell. Christo Lukarsky, Dr. Ognyan Petrov, 10 participants	MoES	BGN 8,329	Ecology
III. Projects, additionally financed by contracts with ministries, organizations and private companies from the country.					
1	Updating of Dimensions and Positions of Green Areas in the Region of Plovdiv Municipality Based on Photo-revision	Sen. Res. Dr. Roumen Nedkov, 6 participants 2 PhD students	Contract 2003 – 2004 SRI-BAS - Plovdiv Municipality	BGN 40,000	Urban Planning
2	Web-Based Monitoring Investigation of Atmospheric Pollution in the Region of Stara Zagora Municipality Based on Satellite Data	Sen. Res. Dr. Lachezar Filipov, Sen. Res. Dr. Roumen Nedkov, 16 participants, 3 PhD students	Contracts - Stara Zagora Municipality – SRI-BAS	BGN 58,790	Ecology
3	Pilot Investigation of Part of the Lakes in the Territory of Tundzha Municipality Based on Satellite and GPS Data	Sen. Res. Dr. Roumen Nedkov, 10 participants, 2 PhD Students	76/08/2006 Tundzha Municipality – SRI-BAS	BGN 3,260	Urban Planning

4	Pilot Ecological Monitoring Investigation of the Region of the Kardzhali Municipality Based on Satellite and Ground-Based Data	Sen. Res. Dr. Lachezar Filipov, Sen. Res. Dr. Roumen Nedkov, 14 participants, 1 PhD student	4188-01/10.06.2008	BGN 12,600	Urban Planning
5	Pilot Monitoring Investigation of the Ground Cover (Forests and Agricultural Areas) in the Territory of the Kardzhali Municipality Based on Satellite and Ground-Based Data	Sen. Res. Dr. Lachezar Filipov, Sen. Res. Dr. Roumen Nedkov, 11 participants	4187-01/10.06.2008	BGN 11,200	Urban Planning
6	Radio Proximity Fuze for Mortars	Assoc. Prof. Dr. Petar Genov, 3 participants	ARCUS Co, Bulgaria	USD 70,000	Military
7	Optical Proximity Fuze for Mortars	Assoc. Prof. Dr. Petar Genov, 3 participants	OPTIX Co, Bulgaria	BGN 4,500	Military
8	Proximity Radiolocation System	Assoc. Prof. Dr. Petar Genov, 3 participants	ARSENAL JSCo, Bulgaria	BGN 90,000	Military
9	Development of Methodology and Technology for Manufacturing of Hard Gear Systems Using Nanotechnology	Coordinator "Technocontact Ltd." Rousse Partner: Assoc. Prof. Dr. Stavri Stavrev - SRI-BAS	National Innovation Fund, 4IF-02-5	Total: BGN 200,000 SRI – BAS BGN 40,122	Industry
10	Creation of a Portable System for Counting of Somatic Cells	Res. Fell. Chisto Lukarsky	BSMEPA BIF-02-14/ 04.12.2008	BGN 30,568	"Milcotronic" PLC, St.Zagora
11	Training of Specialists from the Aerospace Monitoring Centre – MoES	Prof. Dr. Petar Getsov, Prof. Garo Mardirossian, DSc 3 participants 1 PhD student	MoES D-268/29.11.07 D-287/ 14.12.07 D-151/ 18.06.08	BGN 5,154	Environment
12	System for Early Detection, Localization and Notification of Field And Forest Fires on Territory of the Republic of Bulgaria	Prof. Dr. Petar Getsov, 14 participants 1 PhD student	State Agency "Civil Protection" - Contract N CH 02-205/24.11.2005	BGN 16,500	Ecology

IV. Projects, additionally financed according to contracts and programs of EU, NATO, UNESCO and other international organizations					
1.	Enhancing the Qualification and Retaining a Young Scholars' Team in the Field of Aerospace Technologies as a Prerequisite for Monitoring and Preservation of the Environment and Prevention of Damages Caused by Natural Disasters	Prof. Dr. P. Getsov Sen. Res. Dr. Tania Ivanova, coordinator 12 participants 5 PhD students Partners from Institute of Oceanology – BASq, Varna 3 participants 2 PhD students	ESF - OP "HRD" BG051PO001/ 07/3.3-02/63/ 17.06.08 (2008-2010)	BGN 40,000 (Total: BGN 200,000)	Environment
2	*ESINET* -European Space Incubator Network	Assoc. Prof. Dr. Stavri Stavrev, 18 EU countries	FP5, FP6		Space research
3	*OSNET* - In the framework of *Competitive and Sustainable Growth* to Realize Thematic Network *Thematic Network on Ornamental Stones* (OSNET)	Assoc. Prof. Dr. Stavri Stavrev, Prof. Dr. Paspaliaris, Athens, Greece	GTG1 – 2000 – 28020 2001-2005	Total: USD 7,000,000 For SRI-BAS: USD 20,000	SMEs
4	*Smart – Wire* - Co-operative Research Project from the *Craft* Programme	Assoc. Prof. Dr. Stavri Stavrev, Coordinator "Nuova Faudi", Italy	G1ST-CT-2002-50265 *Craft* Programme 2003-2005 FP5, FP6	Total: EUR 2,200,000 For Bulgaria: EUR 250,000 For SRI-BAS EUR 150,000	SMEs
5	*I-STONE* -Re-Engineering of Natural Stone Production Chain through Knowledge Based Processes, Eco-Innovation and New Organizational Paradigms	Assoc. Prof. Dr. Stavri Stavrev, Coordinator: Prof. Dr. Paspaliaris, Athens, Greece	515762-2 IP VI FP -10	EUR 104,000	SMEs
6	*X-Gear* - Development of Gear Drive-Trains Based on New Materials and Novel Gear Systems	Assoc. Prof. Dr. Stavri Stavrev, 12 participants Coordinator: Donato Zangani - D'Appolonia, Genua, Italy 9 country – 23 partners	N030433	Total for Bulgaria: EUR 250,000 For SRI-BAS: EUR 119,498	Transport

7	*NAVOBS* - A Support Measure to Boost the Business Prospects of GMES and Telecom Satellites through Focused and Innovative RTD Work Involving SMEs	Assoc. Prof. Dr. Stavri Stavrev, Coordinator: Florance Girone, WSL, Belgium 17 countries	Contract № 502903, FP6	EUR 20,000	Communication, Medicine, Ecology
8	*NAVOBS*$^{+}$ The Participation of Small and Medium-Sized Enterprises in Research and Technology Development (RTD) Activities Related to the Development of Innovative Services Based on Space Infrastructures.	Assoc. Prof. Dr. Stavri Stavrev, SRI-BAS Coordinator: Florance Girone, WSL, Belgium 17 countries	Contract №030980, FP6	EUR 20,000	Communication, Medicine, Ecology
9	Development of Strategy and Methods for Monitoring of Elecromagnetic Pollution in the Environment of the Western Balkans,	Prof. Dr. Petar Getsov, SRI-BAS – 23 (4 PhD students), Faraday Foundation – 5, Croatia - 1, FYR Macedonia – IGAPE – 9, Slovenia – 2, Eurosense Ltd – 5	"SEE-ERA.NET Pilot Joint Call" INTAS Ref. Nr 06-10374, (2007/2008).	Total: EUR 18,200 For SRI-BAS BGN 19,780	Environment
10	Magnetosphere/Ionosphere Coupling: Large Scale and Small Scale FAC Structure Interactions and Energy Transfer in the System	Sen. Res. Dr. Dimitar Teodosiev, 2 participants	TNA Program, EISCAT 2007/2008	EUR 760	Environment
11	Kutina Pyramid in Bulgaria	Res. Fell. Vanya Naydenova, PhD student 3 participants 1 PhD students	PLANET ACTION and ESRI (ESRI Conservation Programme)	2 SPOT-5 images EUR 8,100	Environment
12	*SCHEMA* – Scenarios for Hazard-Induced Emergencies Management.	Prof. Dr. Petar Getsov, Prof. Garo Mardirossian DSc., Sen. Res. Dr. Boyko Rangelov	FP6. Ref. Nr BG 2005/017-353.10.06. 030963.	BGN 62,160.	Environment
13	Terrorist Act Consequences Management in South-East Europe- EU TACOM SEE	Sen. Res. Dr. Georgi Sotirov			Civil Protection

14	Establishment of Technology Transfer Offices at Bulgarian Public Research Organizations	Prof. Dr. Petar Getsov Christina Kovacheva 9 participants	EU PHARE Program BG 2005/017-353.10.06/ESC/G/TTO-04	Total EUR 48,170 From SRI-BAS EUR 12,042	Establishment of a meeting point between the scientific output of the Space Research Institute and the business.
V. Projects funded under the Academy's bilateral agreements and in the framework of institute-to-institute cooperation.					
1.	New Tribotechnical Materials and Coatings for Mobile Connected Details and Devices of Space Apparata	Prof. Dr. Yulika Simeonova, 3 participants 1 PhD student	CA-BAS, Ukraine 2003-2005		New materials
2.	Study of New Tribotechnical Material with Ecological Anti-Friction Element	Prof. Dr. Yulika Simeonova, 3 participants 1 PhD student	CA-BAS, Ukraine 2006-2008.		Ecology
3.	*Greenhouse - Mars* – Development and Verification of Light Module on Light-Emitting Diodes for Space Greenhouse in Experiment Mars-500	Sen. Res. Dr. Tania Ivanova, 6 participants 2 PhD students	BAS-RAS/FSR IMBP-RAS (2006-2010)		Agriculture-greenhouse industry
4	*Balkansat* - Development of Micro-Satellite Platform for Scientific Investigations	Prof. Dr. Petar Getsov, Sen. Res. Dr. Roumen Nedkov, 22 participants, 4 PhD students	BAS-RAS/FSR SRI-RAS (2006-2010)		Environment monitoring and security
5	*Charge* - Investigation of Surface Processes of Space Crafts Polarization	Sen. Res. Dr. Georgy Stanev 2 participants	BAS-RAS/FSR SRI-RAS (2006-2010)		Space Application
6	*Biodegradation* - A Study of Anaerobic Biodegradation Possibilities for Organic Waste on Board the International Space Station	Assoc. Prof. Dr. Ivan Simeonov, Institute of Microbiology - BAS 9 participants; SRI-BAS – 2 participants	BAS-RAS/FSR IMBP-RAS (2007-2010)		Environmental and Space Biotechnology
7	*Accretion* - Research in Nonlinear Physics of Accretion Flows in Close Binary Stars	Sen. Res. Dr. Lachezar Filipov 3 participants, 1 PhD student	BAS-RAS/FSR IA-RAS		Physics
8	*Chaos* – Research of Nonlinear Dynamics and Chaos in Space Plasma and Geophysical Processes	Sen. Res. Dr. Stilian Lukov 3 participants, 2 PhD students	BAS-RAS/FSR SRI-RAS (2006-2010)		Physics

9	*Avrora-R* - Research of Dynamic Ionosphere Plasma and Auroral Phenomena in Different Heliogeophysical Conditions on Base of Experimental (Satellite) Data for Electrical Fields and Parameters of Ionosphere Plasma	Sen. Res. Dr. Boycho Boychev 4 participants	BAS-RAS/FSR IZMIRAN-RAS (2006-2010)		Space Application
10	*Potential Action* – Central and Peripheral Mechanisms of Changing Functional Properties of Nerve-mussels System of Man in Weightlessness.	Res. Fell. Soyan Tanev, 2 participans	BAS-RAS/FSR IMBP-RAS, RFSA ROSKOSMOS		Space Medicine Sport
11	Study of ELF/ULF Waves in the Earth's Magnetosphere	Sen. Res. Dr. Dimitar Teodosiev, 1 PhD student	IAF-CzAS (2004-2007)		Space Application
12	ULF/ELF/VLF Characteristics of Magnetospheric Structures Based on Satellite and Ground-Based Observations	Sen. Res. Dr. Dimitar Teodosiev, 1 PhD student	IAF-CzAS (2008-2010)		Space Weather
13	*Shuman* - Study of Satellite and Ground-Based ULF Electromagnetic Field Data for Diagnostic of Solar and Seismic Effects in the Near Earth Space	Sen. Res. Dr. Dimitar Teodosiev, 2 participants 1 participant from GPhI-BAS	BAS-RAS/FSR IZMIRAN-RAS (2008-2010)		Environment
14	Development the Spherical Sensors for Electric Field Measurements on Board "Konopus-Vulkan" Satellite	Sen. Res. Dr. Dimitar Teodosiev, SRI-BAS 4 participants	IZMIRAN - RAS, 1148/26.08.05, (2005-2006)	USD 8,700	Ecology
15	A Study of ELF/ULF Waves and Field-Aligned Current Systems by Satellite and Ground Based Measurements	Prof. Dr. Petar Getsov, SRI-BAS 2 participants	INT/BULGARIA/B28/02 Bulgaria - India		Space Weather
16	Experimental Study of The Ionospheric Effects over Seismically Active Regions by Means of Coordinated Ground Based, DEMETER and DMSP Satellites Data	Res. Fell. Ludmil Bankov 2 participants	Joint Research Project R N 661/18.05.2005		Environment
17	Satellite Observations of The Atmospheric Gravitational Waves	Res. Fell. Ludmil Bankov 2 participants	Joint Research Project R N 665/01.12.2006		Space Application

18	Space/Time Characteristics of The Polarization Jet in the Sub-Auroral Zone by Simultaneous "Intercosmos-Bulgaria 1300", Arcad-3, Dynamics Explorer-B and Jakutian Chain of Ground Based Measurements	Res. Fell. Ludmil Bankov 2 participants	Joint Research Project RN 1654/04.01.05		Space Application
19	*Photocurrent* - Methods for Investigation of the Ionosphere: Photocurrent and Its Influence on the Potential Based on the "ICB-1300" Data	Sen. Res. Dr. Stefan Chapkunov, 3 participants	BAS-RAS/FSR SRI-RAS (2004-2008)		Space Application
20	*Geoecology* - Geoecological Studies of Hazardous Natural Processes Using Remote Sensing and Ground-Based Methods and Geoinformation Technologies	Prof. Hernani Spiridonov, DSc 9 participants Institute of Geography – BAS 1 participant	BAS-RAS/FSR Institute of Geoecology-RAS		Ecology
21	Designing a Geodatabase Model for the Purposes of Large-Scale Mapping of Land-Use Conflicts Caused by Mining Industry Using Remote Sensing and Ground-Based Data	Sen. Res. Dr. Eugenia Roumenina, and Prof. N. Silleos 10 participants 3 PhD students	Joint Res. Project P-16/24.04.07 BAS - the *Aristotle* University of Thessaloniki, Greece		Environment
22	*Resonance* - Use of Satellite Navigation Systems for High Apogee Satellites	Prof. Dr. Petar Getsov, 6 participants 1 PhD student	BAS-RAS/FSR SRI-RAS (2006-2010)		Navigation
23	*Volna-R* - Research of Electromagnetic Waves in Resonance Processes of Energy Transfer in Ionosphere – Magnetosphere Plasma on Based Measurements from High Apogee Satellites.	Sen. Res. Dr. Boycho.Boychev 4 participants	BAS-RAS/FSR SRI-RAS (2006-2010)		Space Application

VI. Projects/contracts and commissions assigned from outsourcers, including state or private companies from the country or abroad					
1	**Participation in successful projects for the NASA X-ray Observatory Chandra** 1) "Spatially resolved grating spectrometry of the newborn supernova remnant SNR1987A", PI: Richard McCray (Univ. of Col., USA), in 2004 and 2008 2) " Chandra Monitoring of SNR 1987A", PI: David Burrows (Pennsylvania State Univ., USA), in 2004 - 2008, 3) "A Rich Population of Massive Young Stars in the Cluster Westerlund 1", PI: Steve Skinner (Univ.of Colorado, USA), in 2005 4) A"Survey of X-ray Emission from Nitrogen-rich Wolf-Rayet Stars", PI: Steve Skinner (Univ. Col., USA), 2008	Sen. Res. Dr. Svetlozar. Zhekov 1 participant			Astronomy and Astrophysics
2	Synthesis of cBN with shock-wave methods	Assoc. Prof. Dr. Stavri Stavrev, - 8 participants	.2006 - 2010		Industry
3	Dispersed Hardening Al alloys	Assoc. Prof. Dr. Stavri Stavrev, - 5 participants, PhD students: 4 TU, Istanbul, Turkey, 1- TU, Sofia	-		Industry
4	Project *Gamma Covers for Acoustic Protection*	Assoc. Prof. Dr. Stavri Stavrev, Contract with DCNS – France	№5090695/29. 01.2008	23069.00 BGN	Industry
5	Study of the Electromagnetic Field Generated by Power Transmission Lines and Communication Equipment in the Republic of Macedonia	Prof. Garo Mardirossian, DSc 3 participants; 2 PhD students 1 participant from the Institute of Hygiene	GAPE Institute – Skopje, FYR of Macedonia Nr-11/2006	EUR 2,000 EUR 400	Environment
6	Geoecological Assessment of the *Kutina Sports Centre – Golf Resort* Object Site	Sen. Res. Dr. Eugenia Roumenina, 6 participants from the unit 1 participant from the *Central Laboratory of Mineralogy and Crystallography* (CLMC) 2 PhD students	Ferri Group Corp. (Bulgaria) EO OD 008/01.07.2007	BGN 18,000 VAT excluded	Ferri Group Corp. (Bulgaria) Ltd

7	Performance of Studies, Analyses, and Expert Appraisals for the *Kutina Sports Centre – Golf Resort* Object Site under Project 044 - *Kutina Sports Centre – Golf Resort*	Sen. Res. Dr. Eugenia Roumenina, 7 participants 2 participant from the *Central Laboratory of Mineralogy and Crystallography* 2 PhD students	Kutina Sports Centre PLC Nr-012/10.12.2006	BGN 28,182 VAT excluded	Kutina Sports Centre PLC
8	Development of an Alternator	Sen. Res. Zhivko Zhekov, DSc in Engineering 5 participants	ARCUS Lyaskovets AD Nr-2/2.11.2004	BGN 5,600	ARCUS Lyaskovets AD
9	Scientific-Applied Developments in the Field of Public Economy	Sen. Res. Dr. Zhivko Zhekov, DSc in Engineering 5 participants	TUSMI OOD – Town of Shoumen Nr-1/03.01.2007	BGN 8,994	TUSMI Ltd – Town of Shoumen
10	Scientific-Applied Developments to the Bulgarian Telecommunication (BTC) System	Sen. Res. Dr. Zhivko Zhekov, DSc in Engineering 5 participants	DTA-PKS OOD – Town of Shoumen Nr-2/03.01.2007	BGN 1,730	DTA-PKS Ltd – Town of Shoumen
11	Development of Methodology and Creating a National Data Base for NDVI, NPP and LAI Based on Satellite Data from NOAA AVHRR and MODIS.	Sen. Res. Dr. Eugenia Roumenina, 3 participants 4 PhD students	Contract between SRI-BAS and *Kontrax* Company, PLC No. DB 08/01.12.06.08	BGN 30,000 VAT excluded	*Kontrax* Company PLC
12	Service Provision Agreement	Sen. Res. Dr. Zhivko Zhekov, DSc in Engineering 5 participants	HERTI AD Town of Shoumen	BGN 2,000 VAT excluded	HERTI AD Town of Shoumen
13	Service Provision Agreement	Sen. Res. Dr. Zhivko Zhekov, DSc in Engineering 5 participants	Agricultural Producer Tsenov	BGN 833 VAT excluded	Agricultural Producer Tsenov

14	Service Provision Agreement	Sen. Res. Dr. Zhivko Zhekov, DSc in Engineering 5 participants	Agricultural Producer Tsenov	BGN 3,333 VAT excluded	Agricultural Producer Tsenov
15	Carrying out a Research about the Characteristics of Air Devices in Order to Develop and Update the Operational and Repair Engineering Specifications as well as Adapt to Domestic Conditions the Engineering Specifications of the Manufacturer.	Assoc. Prof. Dr. Victor Patov, 8 participants	Contracts with 11 aviation companies and organizations	BGN 456,670	Transport
16	Carrying out a Research about the Alteration in the Features of Air Hydraulic Components Being in Service as well as Development of Technological Processes to Restore Their Serviceability	Assoc. Prof. Dr. Dimitar Jordanov, Eng. R. Radushev, 8 participants	Contracts with 9 aviation companies and organizations	BGN 273,522	Transport
17	Modernization of Ground Mobile IFF Systems according to NATO - STANAG 4193 Requirements	Prof. Dr. Petar Getsov, Sen. Res. Dr. Georgi Sotirov, Dr. Stoyan Avramov, 12 participants	Contract № 412/30.03.06 SRI / "Bitova Electronika"	BGN 234,699	Military
18	Protection from High Energy Weapons	Sen. Res. Dr. Georgi Sotirov, 10 participants	Ministry of Defence Contr. № Ef 3092/30.09.04	BGN 10,000	Military
19	30-mm Special Ammunition for 2A42 gun.	Prof. Dr. Petar Getsov	Contract N 01-A2788/04.05.2001-2008 with company Arcus	BGN 16,000	Military
20	Recording over the Flight Plans	Sen. Res. Dr. Petar Stoyanov	Contr.УD-04-12/11.04.2006 with MoD	BGN 48,000	Transport

ANNEX 2

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2.3. Scientific books published

2.3.1. Abroad

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2.3.2. In Bulgaria

1. Jekov, J., *Optical Systems for Observation of Remote Objects, Bishop Konstantin Preslavski* University of Shoumen, Publishing House, Shoumen, 2007, 251 [in Bulgarian].
2. Jekov, J., *Optical Techniques and Instrumentation for Identification of Remote Objects from Board of Spacecraft, Bishop Konstantin Preslavski* University of Shoumen Publishing House, Shoumen, 2006, 308 [in Bulgarian].
3. Jordanov, D., *Computer Models of Control Systems of Airplanes and Helicopters*, Publishing House of the Technical University, Sofia, 2005, Part I - 73, Part II - 85 [in Bulgarian].
4. Mardirossian, G., *Natural Disasters and Ecological Catastrophes – Study, Prevention, Protection, Marin Drinov* Academic Publishing House, Sofia, 2007, 372 [in Bulgarian].

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Publications of the research staff of SRI-BAS for the period 2004 – 2008

Numbers of papers published between 2004-2008	**2004**	**2005**	**2006**	**2007**	**2008**	**Total by type**
2.1.1. In science journals abroad	11	11	19	22	12	75
2.1.2. In science journals in Bulgaria	27	25	17	13	26	108
2.2.1. In full text in congresses and symposia proceedings abroad	14	22	12	11	14	73
2.2.2. In full text in congresses and symposia proceedings in Bulgaria	63	115	80	26	106	390
2.3.1. Scientific books published abroad			1			1
2.3.1. Scientific books published in Bulgaria	2	1	1	3	2	9
Total by year	**117**	**174**	**130**	**75**	**160**	**656**

ANNEX 3

Annex 3: List of scientific products ready to be implemented in industry.

1. Modernization of Identification “Friend or Foe” (IFF) Systems according to NATO STANAG 4193 Requirements. (ANNEX 1, VI ,17)
2. Ground Mobile IFF Systems - VT-1, VT-1-01 and ST-68УМ-ВТ (ANNEX 1,VI, 17)
3. System for Early Detection, Localization and Notification of Field and Forest Fires on Territory at Republic of Bulgaria. (ANNEX 1, III,12)
4. Centre for Airspace Monitoring (ANNEX 1, III, 11)
5. Technologies for Synthesis and Application of Ultra Dispersed Diamond Powder. (ANNEX 1, II, 4)
6. 2-Channel Full Disclosure ECG Holter- ER02 (ANNEX 1, IV,14)
7. Portable Pulse Oximeter Recorder SP01 (ANNEX 1, IV,14)
8. 12-Channel Electrocardiograph C-12 (ANNEX 1, IV,14)
9. Security Access Control System P-4000 (ANNEX 1, IV,14)
10. New Class Anti-Frictional Composite Materials on Copper Base. (ANNEX 1, V, 1)
11. Joint Sight with Variable Zoom. (ANNEX 1, I, 23)
12. Sight with Gradually Variable Zoom. (ANNEX 1, I, 24)
13. 12-chennel system for greenhouse environment monitoring and control (ANNEX 1, II, 1)
14. LED Light Module with tunable red-green-blue (RGB) spectra – for night lighting of greenhouses (ANNEX 1,V, 3)

As result of scientific and scientific- applied activities during current period (2004-2008) in SRI – BAS are created 14 new products. Some of them 3 pcs (position 2) are already instilled in industry.

ANNEX 4

Annex 4: Table of the scientific products, inventions and patents produced over the period 2004-2008, presented within the following columns: heading, registration number of the patent, etc., user, mode of participation of the scientific unit in the implementation, mode of realization (e.g. marketing, implementation, etc.), effect of the realization, transfer of technologies under contracts with industry.

Heading	Registration number of the patent, etc	User	Mode of participation of the scientific unit in the implementation	Mode of realization (e.g. marketing, implementation, etc.)	Effect of the realization
Unit for determination of the energy condition of frictioning surfaces	Reg. N 103270 BG 63852B1	On R400 onboard of Space Station MIR	SRI-BAS Astrukova M. GrozdanovaT. MardirosianG. Nedkov R. SimeonovaY. Cholakov G.	Space and Ground Engineering	Extansion of the operation time of rotational mechanisms
Technology for synthesis of withoutcobalt segments for cutting granite	License	Companies involved in the project I-Stone	A team	In Industry	Subject to assessment by the EC
Ground mobile IFF system VT-1	412/30.03.2006 SRI-BAS Bitova Elektronika AD	Ministry of Defense	A team of experts were involved in the project VT-1	Constructor and operational documentation was developed, 787 pages.	Inculcating the device on service of Ministry of Defense
Ground mobile IFF system VT-1-01	412/30.03.2006 SRI-BAS Bitova Elektronika AD	Ministry of Defense	A team of experts were involved in the project VT-1-01	Constructor and operational documentation was developed, 775 pages	Inculcating the device on service of Ministry of Defense

Ground mobile IFF system ST-68-UM-VT	412/30.03.2006 SRI-BAS Bitova Elektronika AD	Ministry of Defense	A team of experts were involved in the project ST-68-UM-VT	Constructor and operational documentation was developed, 741 pages	Inculcating the Device on Service of Ministry of Defense
Joint finder with discrete varying zooms	108812/ 19.07.2004 Official bulletin of Patent Office of Republic of Bulgaria, No9/2004	Ministry of Defense Ministry of Interior :	Zhekov Zh. Mardirossian G.. Getsov P.	Production of optical and electrooptical Equipment Space Application	Increase of the Accuracy and Reliability
Composite antifriction self-lubricating material based on copper	No73217/21.05. 2004	Onboard of Space Ship and Stations	Kostornov A. Simeonova Y. Getsov P. et all.	Space and Ground Engineering	Increase of the Quality and Reliability
New antifrictional self-lubricating composite material copper based	N 77601/15.12.2006	Onboard of Space Ship and Stations	Kostornov A. Fushchich O. Chivichelova P.. Simeonova Y.	Space and Ground Engineering	Increase of the Quality and Reliability
System for localizing mobile objects	Patent record No 109480/ 16.03.2006	Ministry of Health Ministry of Transport	A team of experts were involved in the project	An article has almost been made that is intended to track birds' migration.	An Inculcation is Forthcoming.
Sight with gradually varying zoom	109827/ 26.02.2007	Ministry of Defense Ministry of Interior	Mardirossian G. Getsov P. Zhekov Z. Stoianov. S.	Production of optical and electrooptical Equipment Space Application	Increase of the Accuracy and Reliability

High–voltage buffer amplifier	65038/ 05.01.2007	RSC “Enetgy” Russia	Neychev Sl. Stanev G. Getsov P. Chapkanov St. et all.	Development of the Scientific Instrument “DS” for ISS	Increase of the Quality and Reliability
Satellite spectral photo meter intended to investigate small gas components of the atmosphere	109857/ 17.04.2007	Ministry of Ecology Ministry of Emergency Situations	Zhekov Z. Mardirossian G. Getsov P. Stoianov. S. Hristov I.	In Space Instrumentations	Increase of the Accuracy and Reliability

ANNEX 5

Annex 5: Patent-license activities, including individual patents of scientists of the Unit registered over the period 2004-2008. The results have to be presented in tables:

5.1. Support of protection documents:

Columns: authors, headings, participation of external organizations and private persons participating in the support; income from license realization broken down by years.

Authors	**Headings**	**Supported Income by year by Patent**	**Patent maintenance costs**
Stavrev S. Lazarov S. Markov L. Ivanov V.	Method for synthesis of ultradisperse diamond powder BG Pat. No.49267, 16.09.1991 US Pat. No. 5353708, 11.10.1994	Stavrev S.	BGN 2850
Stavrev S. Dimitrova V. Markov L.	Method for production of Aluminium-base composites BG Pat. No.50504, 28.01.1992	Stavrev S.	BGN 1250
Stavrev S.	Method for synthesis of diamond monocrystals BG Pat. No.99083, 30.09.1994	Stavrev S.	BGN 1250
Stavrev S.	Method for synthesis of diamond monocrystals BG Pat. No.99082, 30.09.1994	Stavrev S.	BGN 1250
Stavrev S.	Method for improving the working parameters of lubricating oils BG Pat. No.100054, 09.10.1995	Stavrev S.	BGN 750
Stavrev S. Lazarov S. Markov L. Ivanov V.	Method for production of ultradispersed diamond US Pat. No.5353708, 11.10.1994	Orix techn. Frimont USA	USD 830
Stavrev S.	New carbon allotropic modification BG Pat. No.104645, 31.07.2000	Stavrev S.	BGN 700
Mitev D.	Pyrotechnic smoke-forming composition, BG Pat. № 64003	Mitev D.	BGN 220

Mardirossian G.	Device for Automatic Digital Registration of Geomagnetic Field Parameters. Reg. No 106992/18.02.2002. BG Patent No 65077/ 27.02.2007.	SRI - BAS	BGN 135
Mardirossian G.. Getsov P. Zhekov Zh. Stoyanov S.	Backsight with Gradually Changing Zoom, Reg. No 109827/26.02.2007.	SRI - BAS	BGN 165
Zhekov Zh. Mardirossian G. Stoyanov S.	Characteristics Assessment Equipment for Electronic-Optic Transducers, Reg. No 109853/05.04.2007.	SRI - BAS	BGN 230
Zhekov Zh. Mardirossian G. Getsov P. Stoyanov S. Hristov I.	Satellite Spectrophotometer for Investigation of Small Gaseous Atmospheric Components, Reg. Nr-109857/17.04.2007.	SRI – BAS Zhekov Zh. Contract	BGN 165
Mardirossian G.	Seismoreceiver with Electromagnetic Transducer Field, Reg. No 108773/25.06.2004.	SRI - BAS	BGN 165
Mardirossian G. Zhekov Zh. Terziev T. Germanov V. Stoyanov S.	Spectrophotometer for Atmospheric Investigation. Reg. No 108893/04.10.2005.	Zhekov Zh. Contract	BGN 290
Neytchev S. Stanev G. Getsov P. Chapkunov S. et all.	High-Voltage Cushion Amplifier, Patent Reg. No 65038/05.01.2007.	SRI - BAS	BGN 290
Getsov P. Avramov S. Kostadinov S.	Radar System for Identification of the Air Vehicles, Patent record No 542968/2006.	SRI - BAS	BGN 310

Kostornov A. Simeonova Y. Getsov P. et all.	Composite Antifriction Self-Lubricated Material Based on Cuprum Patent record No 732117,C22C9/08, 1/02/15.06.2005	Ukraine	USD 800
Kostornov A. Fushchich O. Chivichelova P. Simeonova Y.	New antifrictional self-lubricating composite material copper based N 77601/15.12.2006	Ukraine	USD 700
Teodosiev D. Georgiev J. Stanoev M. Gyurov S.	Method for Producing of Powdermetallurgy Materials BG Patent B1 65014/ 29.12.2006	D. Teodosiev Contract	BGN 750
Shkevov R.	BG Patent 65422/29.09.2008 Method and Device for Protection of Space Complexes during Active Experiments	SRI - BAS	BGN 290

5.2. Applications for protection documents under way:

Authors	**Names**	**Countries**
Zhekov Zh. Mardirossian G. Getsov P.	Joint finder with discrete varying zooms Patent application No 108812 Official bulletin of Patent Office of Republic of Bulgaria, No 11/2004, p. 27.	Bulgaria
Getsov P. Simeonov P. Boytchev B. Mardirossian G. Manev T.	Movable Objects Localization System Patent application No 109480/ 16.03.2006 Official bulletin of Patent Office of Republic of Bulgaria, No 8/2006, p. 18.	Bulgaria

STAFF STRUCTURE OF SPACE RESEARCH INSTITUTE - BULGARIAN ACADEMY OF SCIE

Name of the structural unit, laboratory, department etc. (according to the organizational chart)	Total staff		Including											
			Research staff											
	Number of positions	Number of occupied positions	TOTAL	Senior research fellows							Junior research fellows			
				Total number	including						Total number	out of them		
					Acad.	Corr.-mem	Prof.	Sr. res.fell I degree	Assoc. Prof.	Sr. res.fell. II degree		res.assoc I degree	res.assoc II degree	res.assoc III degree
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
I. TOTAL STAFF	**127**	**125**	**78**	**22**				**4**	**3**	**15**	**56**	**33**	**7**	**14**
INCLUDING PART-TIME EMPLOYED														
II. STAFF BY STRUCTURAL UNITS														
Administrative-economic department	26	26	5	5				2		3				
Space physics	14	14	12	3						3	9	7	1	1
Astrophysics and non-linear dynamics	7	7	7	1						1	6	1	3	1
Remoute sensing of the earth	17	17	12	3				1		2	9	5		4
Aerospace information center	6	6	5	1						1	4	2		2
Space biotechnologies and vacuum studies	12	12	7	1				1			6	6		
Aerospace engineering and technologies	7	6	5	2					1	1	3	3		

Aerospace control systems	23	22	15	5					1	4	10	4	2	3
Space materials science and technologies	15	15	10	1					1		9	5	1	3

Human resources: **Chief accountant:**

ANEX 7

BREAK DOWN OF THE PERSONEL BY AGE GROUPS BY 31.12.2008

research unit **SPACE RESEARCH INSTITUTE - BULGARIAN ACADEMY OF SCIENCES**

Number	**AGE GROUPS IN YEARS**										
	under 26	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66-70	over 70
Academicians											
Corr.-members											
Sr. research fellows I degree and Professors								2	1	1	
Sr. research fellows II degree and Associated Professors							3	6	2	7	
Research associates I degree			1	2	3	4	7	7	5	3	
Research associates II degree			3	2	1			1			
Research associates III degree	1	4	6	2							
Specialists with higher education	1	1	1	1	1	4	3	5	2	1	

Human resources:

Chief accountant:

ANNEX 8

INFORMATION ABOUT
PHD STUDENTS BY 31.12.2008

Research unit: SPACE RESEARCH INSTITUTE

PhD STUDENTS BY 31.12.2008 (for the entire period 2004-2008)				NUMBER OF AWARDED PhD DEGREES (for the entire period 2004-2008)			
	including				including		
Total	* N	* F	* W	**Total**	* N	* F	* W
1	2	3	4	5	6	7	8
28	**26**	**2**	**14**	**7**	**6**	**-**	**5**

- N -number of National PhD students; F -number of Foreign PhD students; W - number of Women

ANNEX 9

Tables presenting the participation of scientists from the unit in teaching and training:

9.1. In institutions of higher education:

9.1.1. Lectures and specialized classes:

Topic	**Lecturer**	**Degrees and titles**	**Institution of higher education**	**Total number of academ. hours**	**Academic yaer**
Informational Technogies in Ecology and environment protection	Roumen Nedkov	Assoc. Prof., Dr.	*St. Kliment Ohridski* University of Sofia	30	2007/2008
Informational Technogies in Ecology and environment protection	Roumen Nedkov	Assoc. Prof., Dr.	*St. Kliment Ohridski* University of Sofia	30	2008/2009
Applied Informational (aerospace) Technologies in Water Designe	Roumen Nedkov	Assoc. Prof., Dr.	University of Architecture, Civil Engineering and Geodesy - Sofia	30	2008/2009
Radiocom-munication technics	Petar Genov	Assoc. Prof., Dr.	*Todor Kableshkov* Higher School of Transport - Sofia	90 90 90	2005/2006 2006/2007 2007/2008
Mobile communi-cations	Petar Genov	Assoc. Prof., Dr.	*Todor Kableshkov* Higher School of Transport – Sofia	60 60	2006/2007 2007/2008
Shocks methods for synthesis of nanostructure	Stavri Stavrev	Assoc. Prof., Dr. (Prof. at the TUI)	Technical University in Istanbul, Turkey	22	2006/2007 2007/2008
Materials Science	S. Vasseva	Res. Fell.	Private Transport College -	30	2008/2009

			Sofia		
Drugs	Yulian. Karadjov	Res. Fell., Dr.	New Bulgarian University	30	2007/2008
General Geology and Quaternary Geology	Hernani. Spiridonov	Prof., DSc	*St. Ivan Rilski* University of Mining and Geology	60 75 45 45 45	2004/2005 2005/2006 2006/2007 2007/2008 2008/2009
Space Geodetic Systems	Nikola Georgiev	Prof., DSc	New Bulgarian University	30	2004/2005
Remote Sensing and Airspace Research Equipment	Garo Mardirossian	Prof., DSc	New Bulgarian University	30	2004/2005
Natural Disasters and Ecological Catastrophes	Garo Mardirossian	Prof., DSc	New Bulgarian University	30 30 30	2004/2005 2005/2006 2006/2007
Airspace Methods in Ecology and Environment	Garo Mardirossian	Prof., DSc	New Bulgarian University	30 30 30 30	2005/2006 2006/2007 2007/2008 2008/2009
Airspace Means for Monitoring in Area of Ecology and Security	Petar Getsov	Prof., DSc	New Bulgarian University	90 60 60 30	2004/2005 2005/2006 2006/2007 2007/2008
Air Polution and Influence on Environment	Zhivko Zhekov	Prof., DSc	*Konstantin Preslavski* University of Shumen	90	2004/2005
Metrology	Zhivko Zhekov	Prof., DSc	*Konstantin Preslavski* University of Shumen	30	2008/2009
On Board Control Systems	Petar Getsov	Prof., Dr.	Technical University of Sofia Branch Plovdiv	30 30	2005/2006 2006/2007
Aviation Communication and Information Systems	Boytcho Boytchev	Assoc. Prof., Dr.	Technical University of Sofia	60 60 60 60 60	2004/2005 2005/2006 2006/2007 2007/2008 2008/2009
Aviation Control Systems for Air Vechicles	Dimitar Yordanov	Assoc. Prof., Dr.	Technical University of Sofia	60 60 60	2004/2005 2005/2006 2006/2007

				27 27	2007/2008 2008/2009

Whole for the period: 15 lecturer, more than 1700 Acad. hours

9.1.2. Practices and seminars:

Columns: subject or topic; lecturer, degrees and titles; institution of higher education; total number of academic hours for the academic years. This information should be given by year for the period 2004-2008 and as a whole for the period;

Topic	**Lecturer**	**Degrees and titles**	**Iinstitution of higher education**	**Total number of academ. hours**	**Academic year**
Informational Technologies in Ecology and environment protection	Roumen Nedkov	Assoc.Prof., Dr.	*St. Kliment Ohridski* University of Sofia	15	2007/2008
Informational Technologies in Ecology and environment protection	Maria Dimitrova	Res. Fell.	*St. Kliment Ohridski* University of Sofia	15	2007/2008
Informational Technologies in Ecology and environment protection	Roumen Nedkov	Res. Fell.	*St. Kliment Ohridski* University of Sofia	10	2008/2009
Informational Technologies in Ecology and environment protection	Maria Dimitrova	Res. Fell.	*St. Kliment Ohridski* University of Sofia	10	2008/2009
Informational Technologies in Ecology and environment protection	Iva Ivanova	Res. Fell.	*St. Kliment Ohridski* University of Sofia	10	2008/2009
Applied Informational (aerospace) Technologies in Water contruction	Roumen Nedkov	Assoc.Prof., Dr.	University of Architecture, Civil Engineering and Geodesy	30	2008/2009
Computer Graphics and	Plamen Hristov	Res. Fell.	Telemathical Laboratory -	100	2008/2009

Images Processing			BAS		
Informational Technologies for Environment Protection	Maria Dimitrova	Res. Fell.	New Bulgarian University	45	2008/2009
Aviation Communication and Information Systems	Boytcho Boytchev	Assoc.Prof., Dr.	Technical University of Sofia	30 30 30 30 30	2004/2005 2005/2006 2006/2007 2007/2008 2008/2009
Aviation Control Systems for Air Vechicles	Dimitar Yordanov	Assoc.Prof., Dr.	Technical University of Sofia	10 10 10 17 17	2004/2005 2005/2006 2006/2007 2007/20082 2008/2009

Whole for the period: 6 lecturer, more than 400 Acad. hours

9.1.3. Students preparing their bachelor or master theses - numbers by institutions of higher education. This information should be given by year for the period 2004-2008 and as a whole for the period.

Institution of higher education	**Year**	**Number by institutions of higher education**
Technical University in Istanbul, Turkey	2005 2006 2007 2008	3 3 6 4
St. Ivan Rilski University of Mining and Geology	2004 2005	1 1
New Bulgarian University	2004 2005 2006 2007 2008	1 1 1 1 3
St. Kliment Ohridski University of Sofia	2005 2007 2008	1 3 4
Technical University in Sofia	2007	2
University of Architecture, Civil Engineering and Geodesy	2006 2007	2 2

Total Number for whole Period: 39

9.2. Post-graduate training and specialization courses:

Columns: subject or topic; supervisor (lecturer), degrees and titles; place of delivering; total number of academic hours for each year. This information should be given by year for the period 2004-2008 and as a total for the period;

Topic	**Lecturer**	**Degrees and titles**	**Iinstitution of higher education**	**Total number of academ. hours**	**Academic yaer**
Computer Graphics and Images Processing	Plamen Hristov	Res. Fell.	Telemathical Laboratory - BAS	100	2008/2009
Natiral Ecological Hazards	Garo Mardirossian	Prof., DSc	Center of Aerospace Observations - MES	30	2007/2008
Basis of Remote Sensing	Petar Getsov Garo Mardirossian	Prof., Dr. Prof., DSc	Center of Aerospace Observations - MES	30	2007/2008
Sattellite Images Processimg	Petar Petrov Eugenia Roumenina	Assoc.Prof., Dr. Assoc.Prof., Dr.	Center of Aerospace Observations - MES	45	2007/2008

9.4. List of contracts and agreements with institutions of higher education and scientific organizations in the country. This information should be given as a whole for the period.

Institutions and Scientific Organizations	**Town**	**Coordinators**
G. Rakovski Military Academy	Sofia	Prof. P. Getsov PhD O. Petrov
New Bulgarian University	Sofia	Prof. P. Getsov Prof. G. Mardirossian
V. Levski National Military University	Veliko Tarnovo	Prof. P. Getsov Prof. Zh. Zhekov
Technical University	Sofia	Assoc. Prof. D. Yordanov Assoc. Prof. B. Boytchev
Technical University	Plovdiv	Prof. P. Getsov
Military Medical Academy	Sofia	Prof. P. Getsov Res. Fell. S. Tanev
Institute of Metal Science - BAS	Sofia	Prof. P. Getsov Assoc. Prof. D. Teodossiev
Geographical Institute - BAS	Sofia	Assoc. Prof. E. Roumenina
Institute of Astronomy - BAS	Sofia	Assoc. Prof. L. Filipov Assoc. Prof. S. Znekov
Geophysical institute-BAS	Sofia	Assoc. Prof. D. Teodossiev Assoc. Prof. B. Boytchev
Institute of Oceanology - BAS	Varna	Assoc. Prof. E. Roumenina

ANNEX 10

Information about the expert activity of the scientists and the specialists with higher education from the unit:

10.1. List of councils, commissions and other expert bodies of external for BAS institutions (governmental and non-governmental), foundations, organizations, publishing houses and others, where scientists and specialists from the unit are participating. This information should be given as a total for the period.

International

Nr	Expert Ст	Scientific degree/ Title	Council, commission, expert body, etc.
1.	Eugenia Roumenina	Sen. Res., PhD	Member of the European Association of Remote Sensing Laboratories (EARSeL)
2.	Dora Panayotova	-	Member of the European Association of Remote Sensing Laboratories (EARSeL)
3.	Garo Mardirossian	Prof., DSc	Member of the Summit Work Group *Earth Observation (GEO/GEOSS)* at EO 004
			Scientific Council of IGAPE – Skopje, Macedonia
4.	Georgi Jelev	Res. Fell.	Member of the European Association of Remote Sensing Laboratories (EARSeL)
5.	Hernani Spiridonov	Prof., DSc	Programme Committee for Aerospace Studies of the 6th EU FP
6.	Iva Boneva	Res. Fell.	Member of the European Association of Remote Sensing Laboratories (EARSeL)
7.	Lachezar Filchev	Res. Fell.	Member of the European Association of Remote Sensing Laboratories (EARSeL)
8.	Nikola Georgiev	Prof., DSc	International Association of Geodesy (IAG)
9.	Petar Getsov	Prof., PhD	Member of the International Academy for Technological Sciences, Switzerland
10.	Petur Dimitrov	Res. Fell.	Member of the European Association of Remote Sensing Laboratories (EARSeL)
11.	Roumen Nedkov	Sen. Res., PhD	Member of the European Association of Remote Sensing Laboratories (EARSeL)
12.	Stavri Stavrev	Assoc. Prof., PhD	Member of the International Advisory Board on HERF Methods of Synthesis and Modification of Materials
13.	Tania Ivanova	Sen. Res., PhD	Expert at the European Expert Forum
14.	Vanya Naydenova	Res. Fell.	Member of the Society for Conservation GIS
			Member of the European Association of Remote Sensing Laboratories (EARSeL)
15.	Vassil Vassilev	Res. Fell.	Member of the European Association of Remote Sensing Laboratories (EARSeL)
16.	Konstantin Metodiev	Res. Fell., PhD	Member of the American Institute of Aeronautic and Astronautic

National

Nr	Expert Ст	Scientific degree/ Title	Council, commission, expert body, etc.
1.	Hernani Spiridonov	Prof., DSc	Vice-President of the Dedicated Scientific Council on Geographical Sciences at the Higher Testimonial Committee
			Member of the State Committee on Geosciences at the Higher Testimonial Committee
			Member of the National Committee on Geodesy and Geophysics
			Member of the Scientific Committee on Earth Sciences at the *Scientific Research* Fund of the Ministry of Education and Science of the Republic of Bulgaria
2.	Nikola Georgiev	Prof., DSc	Member of the Dedicated Scientific Council on Geodesy at the Higher Testimonial Committee
			Dedicated Scientific Council on Geophysics at the Higher Testimonial Committee
3.	Petar Getsov	Prof., PhD	Chairman of the Bulgarian Astronautic Federation
			Member of the Interinstitutional Committee on Space Issues at the Council of Ministers of the Rep. of Bulgaria
			Member of the Dedicated Scientific Council on Military Sciences at the Higher Testimonial Committee
4.	Stavri Stavrev	Assoc. Prof., PhD	Member of the National Coordination Council on Nanotechnology - NCNT **1**
5.	Tania Ivanova	Sen. Res., PhD	Scientific Secretary of the Dedicated Scientific Council on Geophysics at the Higher Testimonial Committee

10.2. List of the submitted in writing by SRI employees: concepts, programmes, forecasts, expert appraisals, opinions, consultations, reviews (incl. for scientific ranks and title) and the like:

Nr	Expert Ст	Scientific degree/ Title	Council, commission, expert body, etc.
1.	Boytcho Boytchev	Sen. Res., PhD	1 Review of a PhD Thesis
2.	Dimitar Yordanov	Sen. Res., PhD	3 Reviews for the Scientific Research Department of the Technical University of Sofia
3.	Garo Mardirossian	Prof., PhD	1 Review of the book *Electronic Intelligence* by Sen. Res. Dr. Petar Stoyanov
			1 Review for the Higher Testimonial Committee on conferring a scientific degree
4.	Petar Getsov	Prof., PhD	1 Review of a PhD Thesis
5.	Petar Stoyanov	Sen. Res., PhD	1 Expert Appraisal on a Phase 3 Project *Unified Air Traffic Control Centre*
6.	Stavri Stavrev	Assoc. Prof., PhD	Concept for the Establishment of an Educational and Technological Centre for Nantotechnologies and New Materials
7.	Tania Ivanova	Sen. Res., PhD	4 Expert Reviews for the competition of the Scientific Expert Committee on Earth Sciences at the Ministry of Education and Science on project funding
			3 Reviews for the Higher Testimonial Committee on conferring various scientific degrees
8.	Yulika Simeonova	Prof., PhD	1 Review for the Journal of Theoretical and Applied Mechanics

10.3. List of the SRI experts and number of expert bodies (under 10.1.) and written materials (under 10.2.), in which each of them has participated:

Nr	Expert Ст	Scientific degree/ Title	Nr as per the list from 10.1.	Nr as per the list from 10.2.
1.	Boytcho Boytchev	Sen. Res., PhD	-	1
2.	Dimitar Yordanov	Sen. Res., PhD	-	2
3.	Dora Panayotova		1	-
4.	Eugenia Roumenina	Sen. Res., PhD	1	-
5.	Garo Mardirossian	Prof., DSc	2	2
6.	Georgi Jelev	Res. Fell.	1	-
7.	Iva Boneva	Res. Fell.	1	-
8.	Lachezar Filchev	Res. Fell.	1	-
9.	Hernani Spiridonov	Prof., DSc	5	-
10.	Nikola Georgiev	Prof., DSc	3	-
11.	Petar Getsov	Prof, PhD	4	1
12.	Petar Stoyanov	Sen. Res., PhD	-	1
13.	Petur Dimitrov	Res. Fell.	1	-
14.	Roumen Nedkov	Sen. Res., PhD	1	-
15.	Stavri Stavrev	Assoc. Prof., PhD	2	1
16.	Tania Ivanova	Sen. Res., PhD	2	7
17.	Yulika Simeonova	Prof., PhD	-	1

ANNEX 11

I N F O R M A T I O N
on the international scientific activities
of the Space Research Institute
at the Bulgarian Academy of Sciences
in the period 2004-2008

1. List of **the international projects** carried out by scientists/scholars from the unit **in the framework of the Academy's bilateral agreements:**

Nr	With which country/Under which agreement the project is being carried out	Number of the project (see Annex 1)	Project duration from–to	Used annual quota under the bilateral agreement	Realized visits for the period from–to; travel expenses covered by whom
1.	Ukraine (BAS–NAS)	V.1	2003-2005	5 days 7 days	08-12.11.2004 - CA-BAS 14-21.11.2005 - CA-BAS
2.	Czech Republic (BAS-CAS)	V.11	2004-2008	14 days	12-25.06.2004
3.	Czech Republic (BAS-CAS)	V.11	2004-2008	14 days	11.09-05.10.2005
4.	Czech Republic (BAS-CAS)	V.11	2004-2008	14 days	20.06-05.07.2006
5.	Czech Republic (BAS-CAS)	V.11	2004-2008	14 days	22.08-09.09.2007
6.	Czech Republic (BAS-CAS)	V.12	2004-2008	7 days	25.08-03.09.2008
7.	Russia (BAS-RAS)	V.5	2004-2009	77 days	06-20.06.2004 - BAS
8.	Russia (BAS-RAS)	V.5	2004-2009	14 days	02.09.2005 - BAS
9.	Russia (BAS-RAS)	V.5	2004-2009	7 days	15-21.06.2006 - BAS
10.	Russia (BAS-RAS)	V.5	2004-2009	7 days	19-25.05.2007 - BAS
11.	Russia (BAS-RAS)	V.5	2004-2009	7 days	13-20.11.2007 - BAS
12.	Russia (BAS-RAS)	V.5	2004-2009	14 days	03-21.02.2008 - BAS
13.	Russia (BAS-RAS)	V.5	2004-2009	7 days	11-18.09.2008 - BAS
14.	Russia (BAS-RAS)	V.5	2004-2009	7 days	11-18.05.2005 - BAS
15.	Russia (BAS-RAS)	V.5	2004-2009	7 days	19-26.11.2008 - BAS

16.	Hungary (BAS-ASH)	V.5	2004-2009	7 days	24.02-01.03.2006 - BAS
17.	Hungary (BAS-ASH)	V.5	2004-2009	7 days	13-20.06.2007 - BAS
18.	Hungary (BAS-ASH)	V.5	2004-2009	7 days	11-18.05.2008 - BAS
19.	Russia (BAS-RAS)	V.5	2005-2008	7 days	12-21.10.2008 - CA-BAS
20.	France (BAS-CNRS)	V.16	2006-2007	14 days	11.06-25.06.2006 - BAS
21.	France (BAS-CNRS)	V.16	2006-2007	21 days	26.11-15.12.2006 - BAS
22.	France (BAS-CNRS)	V.16	2006-2007	14 days	03.12-17.12.2007 - BAS
23.	Russia (BAS–RAS)	V.19	2006-2007	7 days	16.09-22.09.2006 - RAS
24.	Russia (BAS–RAS)	V.19	2006-2007	7 days	18.11-24.11.2007 - RAS
25.	Ukraine (BAS–NAS)	V.2	2006-2008	8 days	14-21.11.2006 - CA-BAS
26.	Russia	I.16	2006-2008	7 days	10-16.12.2007
27.	Russia (BAS–RAS)	V.19	2006-2010	7 days	11-17.09.2007 - CA-BAS
28.	Russia (BAS–RAS)	V.22	2006-2010	7 days	08-14.02.2007 - CA-BAS
29.	Russia, (BAS–RAS)	V.9	2006-2010	7 days	15-21.05.2008 - CA-BAS
30.	Russia, (BAS–RAS)	V.23	2006-2010	7 days	15-21.05.2008 - CA-BAS
31.	Ukraine (BAS–NASU)	V.2	2007-2008	14 days	22.06-06.07.2007 - NASU
32.	Ukraine (BAS–NASU)	V.2	2007-2008	14 days	29.05-12.06.2008 - NASU
33.	Macedonia (SRI–MOES)	IV.9	2007-2008	12 days	25.06-27.06.2008 (4 pers.)
34.	Norway - EISCAT-TNA	IV.10	2007-2008	6 days	28.06-05.07.2008 EISCAT-TNA/11.10.2007
35.	Greece (BAS - the *Aristotle* University of Thessaloniki)	V.21	2007-2009	10 days	10 -15.09. 2007 Contract Н3-N-1507/05 CA-BAS
36.	Russia	I.7	2009-2011	7 days	27.10-02.11.2008 CA-BAS

2. List of the international projects carried out by scientists/scholars from the structural unit **in the framework of:**

direct bilateral institute-to-institute agreements;

intergovernmental agreements,

EU and NATO programmes;

Nr	With which country/Under which agreement the project is being carried out	Number of the project (see Annex 1)	Project duration from - to	Financial support to the project: - overall; - share for Bulgaria; - share for BAS	Realized visits for the period from – to; travel expenses covered by whom
1.	Project "OSNET"	IV.3	2001-running	Total: USD 7,000,000 For SRI-BAS: USD 20,000	23-26.09.2004, Ianina, Greece, Project "OSNET"
2.	Project "ESINET"	IV.2	2002-running	Total: USD 7,000,000 For SRI-BAS: USD 20 000	19-22.06.2004, Malaga, Spain, 20-23.06.2005, Leon, France, 19-20.07.2005, Brussels, Belgium Project "ESINET"
3.	Project "Smart – Wire"	IV.4	2003–2005	Total: EUR 2,200,000 For Bulgaria: EUR 250,000	01-03.03.2004 Genoa, Italy 28-30.01.2005 Tivoli, Italy 12-15.07.2005 Moscow, Russia Project "Smart – Wire"
4.	EDAS Germany	VI.18	2004-2008		02-17.06. 2006, Germany Bitova Electronika
5.	Project "NAVOBS"	IV.7	2005-2007	EUR 20,000	20-22.04.2005, Brussels, Belgium 06-08.06.2005, Milan, Italy Project "NAVOBS"
6.	Project "I-STONE"	IV.5	2005-2008	Total EUR 7,800,000 EUR 104,000	04-09.05.2008, Lisse, Norway 01-04.09.2008, Alicante, Spain Project "I-STONE"
7.	Contract Nr-11/2006 between the SRI-BAS and the Institute GAPE – Skopje, Macedonia	VI.5	2006-2009	EUR 2,000 BGN 400	For the period 2006-2008 a total of 9 business trips at the expense of GAPE– Skopje, Macedonia
8.	Project "X-Gear"	IV.6	2006-2010	Total for Bulgaria: EUR 250,000 For SRI-	20-24.03.2008, Genoa, Italy 22-25.06.2008, Porto, Spain Project "X-Gear"

				BAS: EUR 119,498	
9.	Projects, Contract with TISNUM, Troitzk, Russia: Synthesis of cBN with Shock-Wave Methods Dispersed Hardening Al Alloys	VI.2	2006-2010	-	12-15.07.2005 Moscow, Russia
10.	SRI-RAS Russia	V.13 V.14 V.18	2006-2010		
11.	IZMIRAN Russia	V.23	2006-2010		
12.	Project "NAVOBS+"	IV.8	2007-2008	EUR 20,000	19-21.02.2008 Tolluza, France 19-23.06.2008, Budapest, Hungary 09-11.09.2008, Brussels, Belgium Project "NAVOBS+"
13.	EU - SEE-ERA.NET – FP6 - Western Balkans	IV.9	2007-2008	EUR 18,020 BGN 19,578	Balchik, 14-17.10.2007, 3 participants Ohrid, Macedonia 27.06.-29.06. 2008 4 participants Contract Д01-805/15.10.2007/ SEE-ERA-NET-03
14.	Transfer Technology Centre – BG 2005/017-353.10.06/ESC/G/TTO-04	IV.14	2007-2008	75% - PHARE Programme; 25% - SRI-BAS	
15.	Project - SCHEMA – Scenarios for Hazard-induced Emergencies Management. Ref. Nr-BG 2005/017-353.10.06.	IV.12	2007-2009	BGN 62,160	2008, France

	030963. 6 EU FP				
16.	Project "Gamma Covers for Acoustic Protection"	VI.4	2008-2009	BGN 23,069.00	-
17.	ESF - OP "HRD" BG051PO001/ 07/3.3-02/63/ 17.06.2008	IV.1	2008-2010	BGN 200,000	France, 22-27.06. 2008, Ministry of Science Canada, 12-21.07. 2008, Ministry of Science Scotland, 28.09 – 03.10. 2008, Ministry of Science

3. Realized visits abroad for participating in **scientific events (congresses, conferences and etc.,** described in the following table:

Country	**Total number**	*Supported by (please enumerate the sources of support)*
Austria	3	"I-STONE", "NAVOBS"
Belgium	8	The organization Committee of the 11th European Solar Physics Meeting and the European Physical Society (EPS)/10-16 .09.2005; "NAVOBS+", "NAVOBS"; Bitova Electronika (Contract Nr-412/ 30.03.2006. between SRI-BAS and *Bitova Electronika* company)
Canada	1	Ministry of Education and Science (Contract BG051PO001/07/3.3-02/63/170608)
Germany	8	Ministry of Education and Science (Contract KI-1-01/03); "I-STONE"; Christian-Albrechts-Universität, SRI-BAS
Greece	6	Project SCHEMA, 6th EU FP Ref. Nr-BG 2005/017-353.10.06.030963; "I-STONE", "OSNET"; (partially) SRI-BAS/18.05-24.05.2008; International Astronomical Union (IAU)/14-19.09.2008
Czech Republic	2	Ministry of Science (Contract BG/ES-1502/2005); SRI
Egypt	1	SRI-BAS/20.10-25.10.2007
England	5	"X-Gear" "NAVOBS+"
France	6	Ministry of Education and Science (Contract BG051PO001/07/3.3-02/63/170608); "NAVOBS+"; (partially) SRI-BAS/02.05-05.05.2005; SRI-BAS/14.06-16.06.2006; CNRS, Orleans, France;

		Bitova Electronika (Contract Nr-412/ 30.03.2006. between SRI-BAS and *Bitova Electronika* company) – 1 pers.
Germany	1	Bitova Electronika (Contract Nr-412/ 30.03.2006. between SRI-BAS and *Bitova Electronika* company)
Hungary	1	"NAVOBS+"
Israel	1	NATO
Italy	13	The organization Committee of the 19th Int. Cosmic Ray Symposium/ 29.08–4.09.2004; Swedish Institute of Space Physics, Uppsala, Sweden (2005-2007); "Smart – Wire", "X-Gear", "I-STONE", "ESINET"
Macedonia	11	SRI-BAS Contract Nr-11/2006 between SRI-BAS and Institute GAPE; Contract SEE-ERA.NET INTAS Ref. Nr-06-1000031-10374, SRI-BAS; SRI-BAS, Bulgarian Astronautical Society – Shoumen Branch; SRI-BAS, Research Centre "Sonchev Zrak", Macedonia; Ministry of Science (Contract BG/D01-805/15.10.2007)
Monte Negro	1	SRI-BAS, Bulgarian Astronautical Society – Shoumen Branch
The Netherlands	2	Bitova Electronika (Contract Nr-412/ 30.03.2006. between SRI-BAS and *Bitova Electronika* company)
Norway	1	EISCAT-TNA/11.10.2007
Poland	4	"X-Gear"; Swedish Institute of Space Physics, Uppsala, Sweden (2005-2007);
Portugal	3	"Smart – Wire", "X-Gear"
Romania	4	"I-STONE"; Swedish Institute of Space Physics, Uppsala, Sweden (2005-2007)
Russia	7	UN; Bilateral agreement; "Smart – Wire", "X-Gear"; BAS
Scotland	1	Ministry of Education and Science (Contract BG051PO001/07/3.3-02/63/170608)
Serbia	1	SRI
Slovakia	1	(partially) SRI-BAS, (partially) The organization Committee of ECRS2008/08-13.09.2008
Spain	5	Ministry of Education and Science (Contract KI-1-01/03), CA-BAS (travel expenses); Polytechnical University of Valencia, SRI-BAS, Contract Nr-NSF-H3-1507/05; "I-STONE", "NAVOBS+"
Sweden	1	Bitova Electronika (Contract Nr-412/ 30.03.2006. between

		SRI-BAS and *Bitova Electronika* company)
Switzerland	1	"Smart – Wire"
Turkey	5	Ministry of Education and Science (Contract KI-1-01/); SRI; SRI-BAS, NSF-H3-1507/05; The organization Committee of 'International Heliophysical Year in Turkey' (partially) under free quotas of a bilateral agreement of the Academy/29.03.–1.04.2006
Ukraine	2	Bitova Electronika (Contract Nr-412/ 30.03.2006. between SRI-BAS and *Bitova Electronika* company)

4. Foreign scientists visiting the research unit:

	Category of visit and financial conditions	**Austria**	**Belgium**	**Croatia**	**England**	**Finland**	**France**	**Germany**	**Greece**	**India**	**Italy**	**Japan**	**Latvia**	**Macedonia**	**The Netherlands**	**Poland**	**Portugal**	**Romania**	**Russia**	**Slovakia**	**Spain**	**Sweden**	**Turkey**	**Ukraine**
1	Under a joint project of a bilateral inter academies agreement	2	7		4	2		5	3		7		15	2	6				82			2		
2	Under free quotas of a bilateral agreement of the Academy																							1
3	Under a project of an institute to institute agreement				1				1			1			2			2	5				1	
4	On invitation extended by the unit																							
5	At the expense of the sending institution						1							3										
6	Under an intergovernmental programme			1			1							2						1				
7	At visitors' own expense								1															
Foreign scientists whose visits exceed two weeks:										7														

Total less than 2 weeks – 159;
Total exceeding 2 weeks – 7.

5. Lists of research scientists who have made visits abroad in 2004-2008:

5.1. Scientists sent on study stays (name, scientific degree, title, country, date and duration of visit);

Name	Scientific degree	Title	Country	Date	Duration of visit
Anna Petrova	Res. Fell.		Romania	04.06.2007	1 week
Daniela Boneva	Res. Fell.		Germany	30.06.2005	15 days
Dimitar Teodosiev	Sen. Res.	Dr.	Czech Republic	12.06.2004	14 days
				11.09.2005	14 days
				20.06.2006	14 days
				22.08.2007	14 days
				25.08.2008	7 days
				08.09.2008	8 days
			Norway	28.06.2008	6 days
			Macedonia	26.06.2008	2 days
Georgi Stanev	Sen. Res.	Dr.	Russia	06.06.2004	14 days
				02.09.2005	7 days
				15.06.2006	7 days
				19.05.2007	7 days
				13.11.2007	14 days
				03.02.2008	7 days
				11.09.2008	7 days
			Hungary	24.02.2006	7 days
				13.05.2007	7 days
				15.07.2008	7 days
Lachezar Filchev	Res. Fell.		Greece	01.10.2007	9 months
Ludmil Bankov	Res. Fell.		Russia	08.10.2004	5 days
			France	11.06.2006	14 days
				26.11.2006	21 days
				03.12.2007	14 days
			Egipt	2007	7 days
			Greece	08. 2008	7 days
Lyudmila Todorieva	Res. Fell.		Russia	11.05.2005	7 days
				19.11.2008	7 days
Mariana Gusheva	Res. Fell.		Turkey	10.10.2007	6 days
Marusja Buchvarova	Res. Fell.	Dr.	Italy	30. 08. 2004	7 days
			Belgium	10.09.2005	6 days
			Turkey	30.03.2006	4 days
			Slovakia	8. 09. 2008	6 days
			Greece	14.09.2008	5 days
Nikolai Bankov	Res. Fell.		Russia	22.03.2006	7 days
				15.05.2007	7 days
				29.05.2008	7 days
Slaveyko Neichev	Sen. Res.	Dr.	Russia	19.05.2007	7 days

Stefan Chapkunov	Sen. Res.	Dr.	Russia	12.03.2004	7 days
				23.09.2007	7 days
Vanya Naydenova	Res. Fell.		USA	01.06.2007	1 month
Roumen Nedkov	Sen. Res.	Dr.	Hungary	26.11.2007	7 days

5.2. Scientists who have made long term visits for research or lecturing (name, scientific degree, title, country, date and duration of visit);

Name	Scientific degree	Title	Country	Date	Duration of visit
Emiliya Yordanova	Sen. Res.	Dr.	Poland	05.01.2004	15 months
Emiliya Yordanova	Sen. Res.	Dr.	Sweden	01.09.2005	21 months
Stavri Stavrev	Sen. Res.	Dr.	Turkey	01.04.2004	1 year
Svetozar Zhekov	Sen. Res.	Dr.	USA	01.11.2004	12 months
Svetozar Zhekov	Sen. Res.	Dr.	USA	01.09.2007	12 months

5.3. Scientists who by December 31, 2008 are still abroad on permitted unpaid leave (name, scientific degree, title, country, date of beginning of visit.).

Name	Scientific degree	Title	Country	Date	Duration of visit
E. Yordanova	Sen. Res.	Dr.	Switzerland	03.01.2008	15 months

6. Number of visits abroad made throughout 2004-2008 on organizational or administrative missions:

Nr	Name	Country	Funding organization Mission	Year Days
1.	Sen. Res. Dr. Georgi Sotirov	Belgium, The Netherlands, Ukraine	*Bitova Electronika* company	2004-2008 – 15 days
2.	Prof. Dr. Petar Getsov	Belgium, The Netherlands, Ukraine	*Bitova Electronika* company	2004-2008 – 15 days
3.	Sen. Res. Dr. Tania Ivanova	Belgium	Ministry of Education and Science Member of AEROSPACE Progr. Committee	2004 - 3 days
4.	Sen. Res. Dr. Tania	Russia	BAS-RAS Bilateral	2005 - 7

	Ivanova		Agreement Member of EWG on FSR	days
			BAS-RAS Bilateral Agreement Member of EWG on FSR	2007 - 7 days
6.	Sen. Res. Dr. Stavri Stavrev	Italy	Sofia Region	2005 - 3 days 2006 - 3 days
		Belgium	EC	2007 - 2 days
7.	Valia Ivanova	Belgium	EC	2007 - 2 days

ANNEX 12

Annex 12: List of scientists from the unit, participating in editorial boards.
This information should be given as a total for the period:

12.1. Of journals in Bulgarian (the journal has to be indicated)

Aerospace Research in Bulgaria

Garo Mardirossian (*Editor-in-Chief*)
Petar Getsov
Nikola Georgiev
Hernani Spiridonov
Lachezar Filipov
Tanya Ivanova
Plamen Angelov
Stavri Stavrev
Stefan Chapkunov
Lubomira Kraleva
Tsveta Srebrova

Machines, Technologies, and Materials
Stavri Stavrev

Ecological Engineering and Environmental Protection
Plamen Angelov

12.2. Of journals abroad (the journal has to be indicated)

Issledovanie Zemli iz Kosmosa (Study of the Earth from Space) – Moscow, Russia
Petar Getsov