UNOOSA United Nations Office of Outer Space Affairs

SOME ASPECT AND PERSPECTIVES OF IMPLEMENTATION OF THE NATIONAL POLICY IN THE FIELD OF EXPLORATION AND PEACEFUL USES OF OUTER SPACE

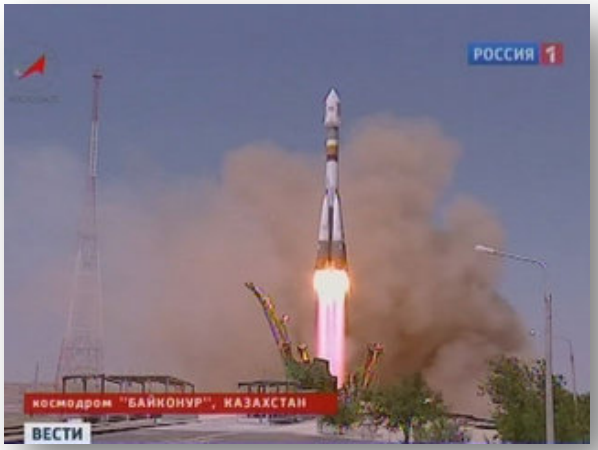
Background

According to the Decree of the President of the Republic of Belarus №278 of June 14, 2007 the **Belarusian Space System for remote sensing of the Earth** is being implemented.

National Space Program of the Republic Belarus has been developed - Resolution № 1517 of the Council of Ministers of the Republic of Belarus from October 14, 2008 "On National Program for Research and Use of Space in Peaceful Purposes for 2008-2012 years"

The main goal of the National Space Program is the development and effective use of scientific and technological potential of Belarus in the filed of creating Space facilities and technologies for the solution of social and economical tasks in the interest of the branches of economy, safety of population and increase of science and education level in the country.

Belarusian Satellite

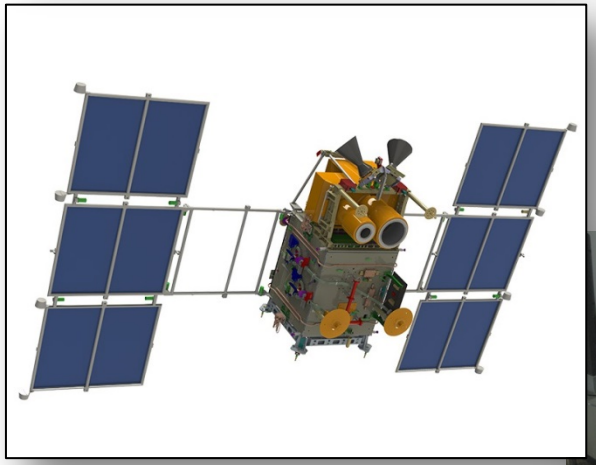


Exploitation period: 5 years (until 2017)

Initiating year: 2007

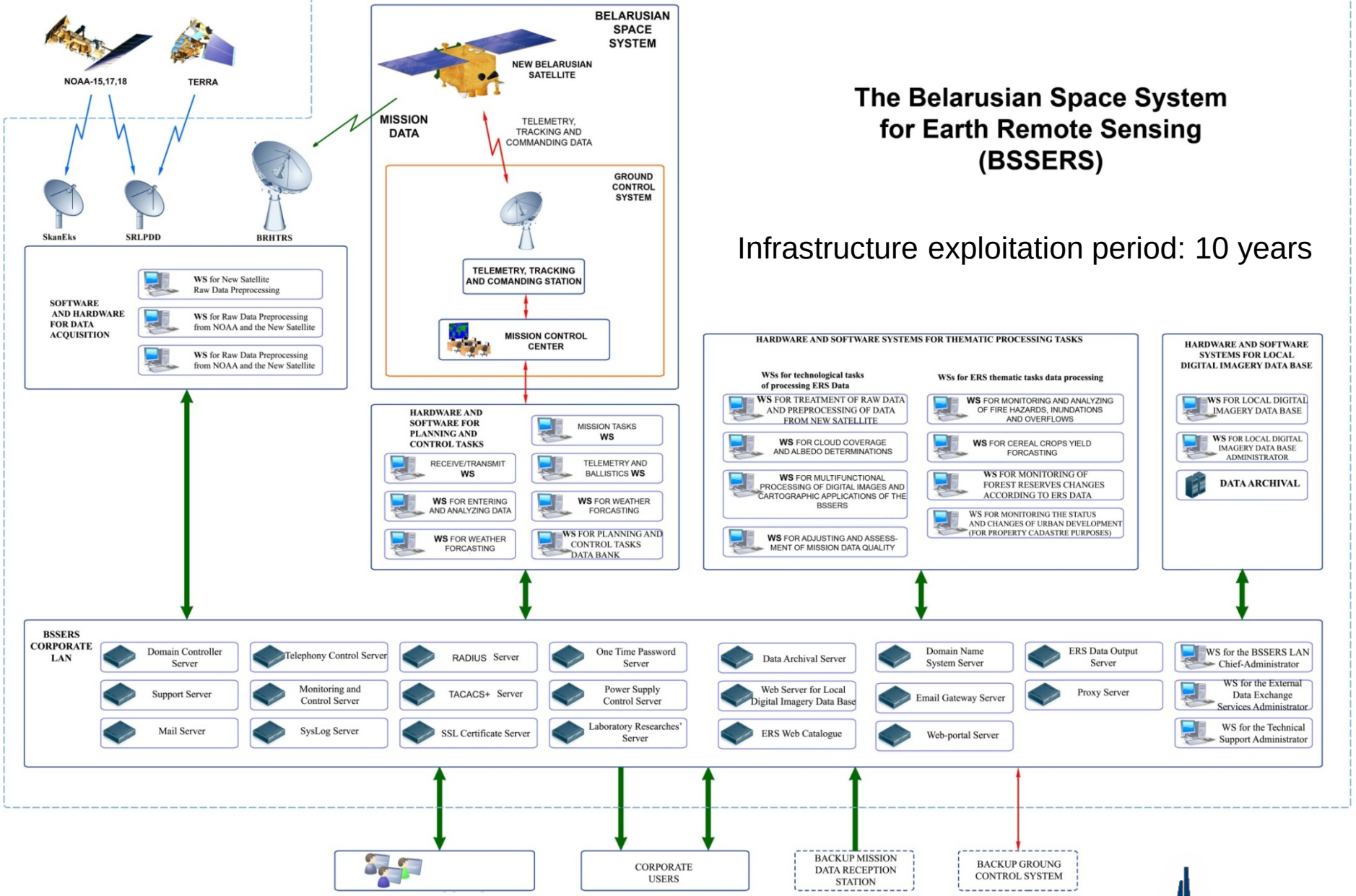
Launch: 22 July 2012

Solar-synchronous orbit raising,km	510 ± 10
Field of view, km	± 440
Swath , km	20
Resolution:	
– panchromatic subsystem, m	2,1
– Multispectral subsystem, m	10,5
In-orbit life, years	≥ 5
Data transfer rate, mbyte/s	up to 245,76
Orientation accuracy, angl. min	5



The Belarusian Space System for Earth Remote Sensing (BSSERS)

Infrastructure exploitation period: 10 years



Policy Making Bullets Achieved

- Intergovernmental agreements with the Russian Federation and Ukraine on cooperation in the field of space activities.
- Currently in the process of signing is an appropriate intergovernmental agreement with the Republic of Kazakhstan.
- Agreed with the Russian Space Agency on the representation of the interests of the Republic of Belarus in The International Charter on Space and Major Disasters

Policy Making Programmes and Responsible Partners

United Institute of Informatics Problems

Head Executor carried out the scientific and organizational support of the National Space Programme

Geo-Information Systems

National Operator of the Belarusian Space System for Earth Remote Sensing

NATIONAL ICT POLICIES KEY RESPONSIBLE BODY

- coordination and state regulation of institutional activities in the exploration and use of outer space for peaceful purposes;
- responsible for national and BY-RU Space Programmes:
  - National Space Program (2008-2012);
  - National Space SubProgram (pending for decision in 2016);
  - Joint Space Program “Cosmos BR” (1999-2002);
  - Joint Space Program “Cosmos SG” (2002-2007);
  - Joint Space Program “Cosmos NT” (2008-2011);
  - Joint Space Program “Monitoring SG” (2013-2017).

RELEVANT R&D PARTNERS AND EXECUTORS

- Research and design-engineering institutions of the National Academy of Sciences of Belarus (at least 13)
- Universities and research institutions of the Ministry of Education of Belarus (at least 6)
- Design-engineering and industrial institutions of the Ministry of Industry of Belarus (at least 2)
- Institutions of the State Property Committee
- Other Belarusian design-engineering and industrial institutions (at least 3)

Space Activities

MAIN TASKS OF BY-SPACE ACTIVITY

- manufacturing Space vehicles for remote sensing of the Earth and perspective technologies for Space facilities creation;
- construction of ground infrastructure for Space information receiving, processing, distribution and Space vehicle control;
- development of information and Space technologies and systems and their introduction in different fields of social and economic activity;
- carrying out the scientific research and scientific and engineering works on creation of basic elements, systems and perspective technologies for Space equipment;
- creation of training and retraining systems and advanced training of staff involved in Space activity;
- forming the state policy in the field of Space activity.

RELEVANT SUBPROGRAMMES

- Development of scientific fundamentals, technologies and perspective instruments for carrying out complex investigations of Space and use of Space information
- Space Systems and Technologies
- Development of Belarusian Space System for Remote Sensing of Earth
- Perspective Belarusian Space Vehicles
- Ecological Monitoring, Hydro-Meteorological Observations and Assessment of Nature Use Efficiency
- Application of Space Information in Geodesy and Cartography
- Monitoring the Natural and Techno-genic Emergencies with the Use of Space Information
- Assessment of Actual Condition of Agricultural areas by Space Information Systems
- Creation of Professional Aerospace Education System
- Organization of Safety Support System for Information Space Technologies
- Application of Space Information in the interests of the Forestry

Agency for Space Research

According to Regulation
of the National Academy of Sciences of Belarus №31 21.05.2015
Agency for Space Research
of the National Academy of Sciences of Belarus
is being established

The Agency is being established

to perform and conduct activities according to the Decree of the President of the Republic of Belarus №609 of 22.12.2004 “On the implementation of the governmental policy of the Republic of Belarus in the field of *Exploration and Use of Outer Space* for *Peaceful Purposes*”
to provide the general state policy, coordination and state regulating of activities in the field of space spatial science.

National System of Satellite Communication and Broadcast

The Presidential Decree has identified the need to create a system of satellite communication and broadcasting of the Republic of Belarus based on its **own geostationary communication satellite.**

Main tasks:

- Provision overseas clients with satellite services;
- Implementation of the latest communication technology providing services to public and private companies;
- Ground satellite network segment deployment and operation of, which effectively complements the existing telecommunication network in the country;
- Provision of satellite broadcasting services to TV-operators and Radio channels;
- Social responsibility mission - to ensure the up-to-date and cost-effective solutions of bringing modern communication technology to the remote areas at affordable prices: TV, broadband access, telephony, telemedicine, distance learning.

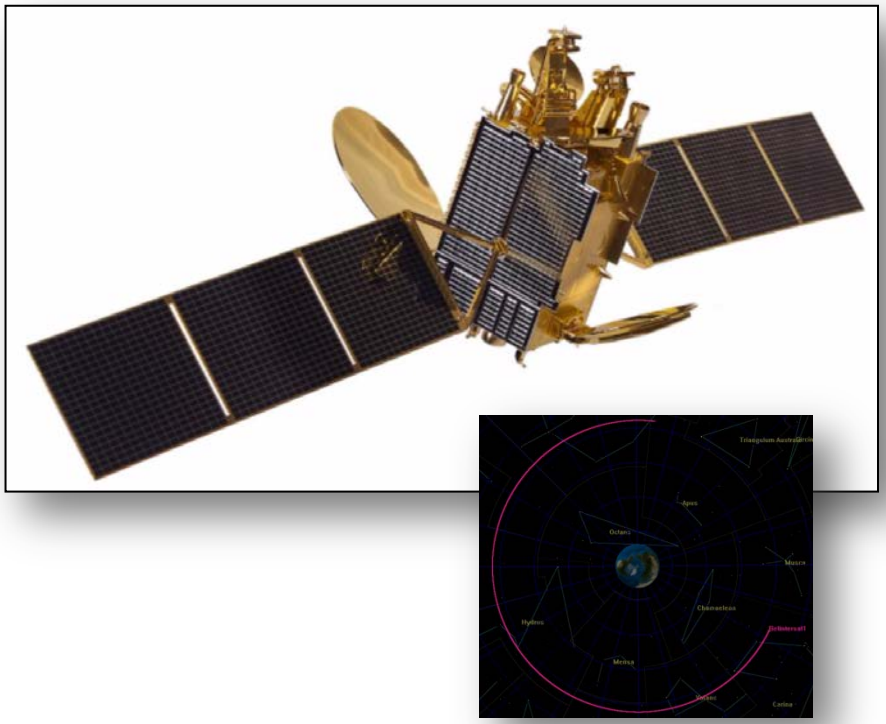
National System of Satellite Communication and Broadcast

January 15, 2016
the Xichang Satellite Launch Center (PRC)

DFH-4 2.36 x 2.10 x 3.60 meters in dimensions.
accommodate payloads of up to 588 Kg,
Two 6-meter solar arrays
DFH-4 is divided into three modules – the propulsion module, the service module and the payload module.

National System of Satellite Communication and Broadcast

Telecommunication services: satellite TV and radio broadcasting, broadband internet access.
The satellite carries transponders operating in C- and Ku-bands.
BELINTERSAT-1 is based on the DFH-4 bus (China) manufactured of 100% certified flight-quality components.

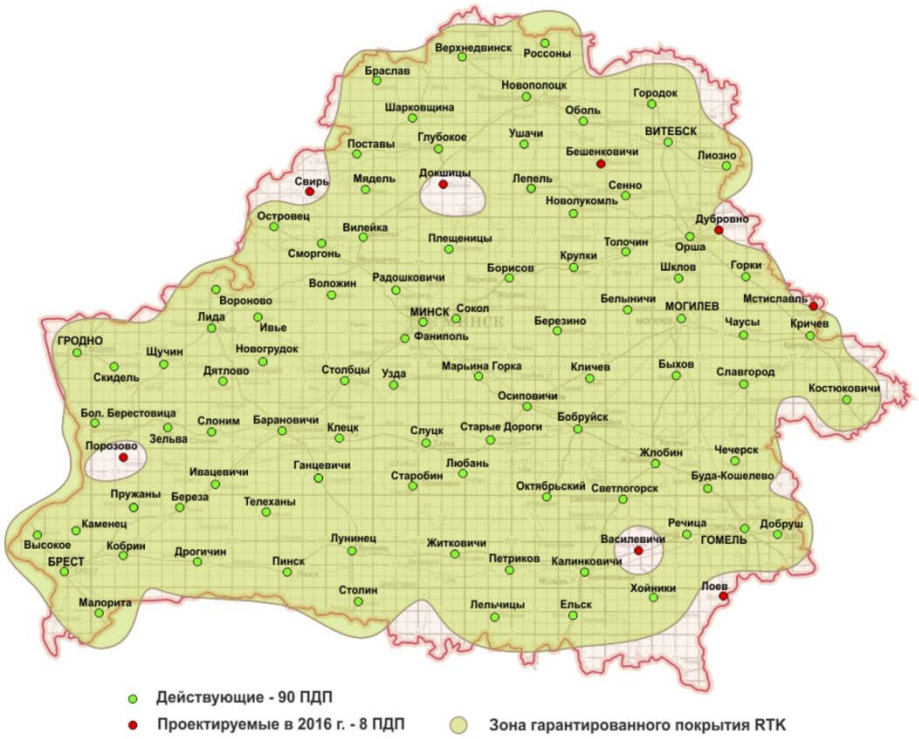


«Thales Alenia Space» (France-Italy) - supplier of the BELINTERSAT-1 payload (transponders).

The BELINTERSAT-1 satellite is placed at the Geostationary Transfer Orbit position 51.5 ° east.

http://en.belintersat.com

Satellite System for Precise Positioning of The Republic of Belarus



Coordinates of geodetic points and terrain objects are presented in the following coordinate systems:

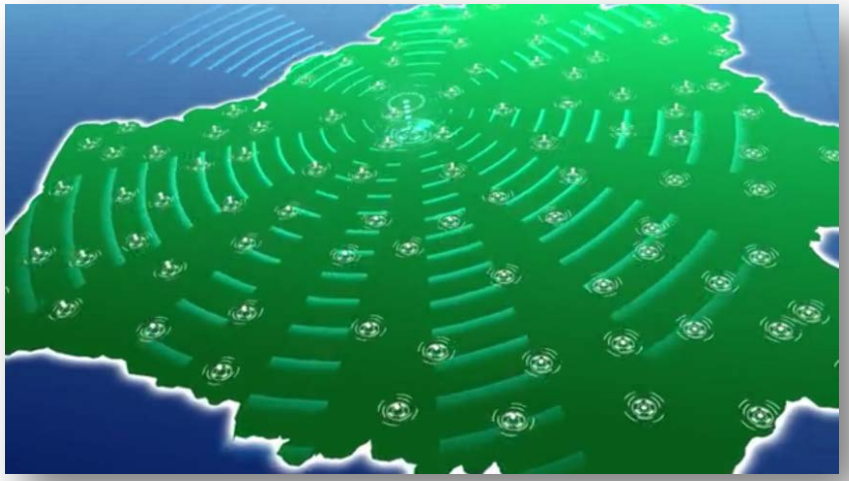
- ITRS - (in the implementation ITRF2005) - for real-time mode;
- ITRS, SC-95, SC-63 or a local system - to the post-processing mode.

On 1 January 2016 SSPP of the Republic of Belarus consists of 90 stations of differential corrections. In 2016, it is planned to create 8 new permanent settlements and fully complete coverage of the country.

Satellite System for Precise Positioning (SSPP) of Republic of Belarus

The accuracy and temporal characteristics of SSPP *in real time*:

- the ability to work with a satellite receiver at any location in the region;
- determination of the coordinates of objects in the ITRS (in implementation ITRF2005) in static mode with a mean square error of 2 cm horizontal and 3 cm in height



The accuracy and temporal characteristics of SSPP *in post-processing mode*:

- determination of the coordinates of points (points) in the ITRS (in implementation ITRF2005) in static mode with a mean square error of 1 cm horizontal and 2 cm in height at the observation time of 1 hour.

Space Education

The finished National space program included educational program with following bullets:

- Development of student space research including development of university satellites and using experimental data from its for education.
- Modernization of the education system (new and updated educational trade, branched).
- International cooperation.
- Development and implementation of international youth projects for the implementation of scientific and educational space experiments.
- Development of Internet and distant education technologies.

Space Education

To succeed in coordination of activities in Space education next steps were done:

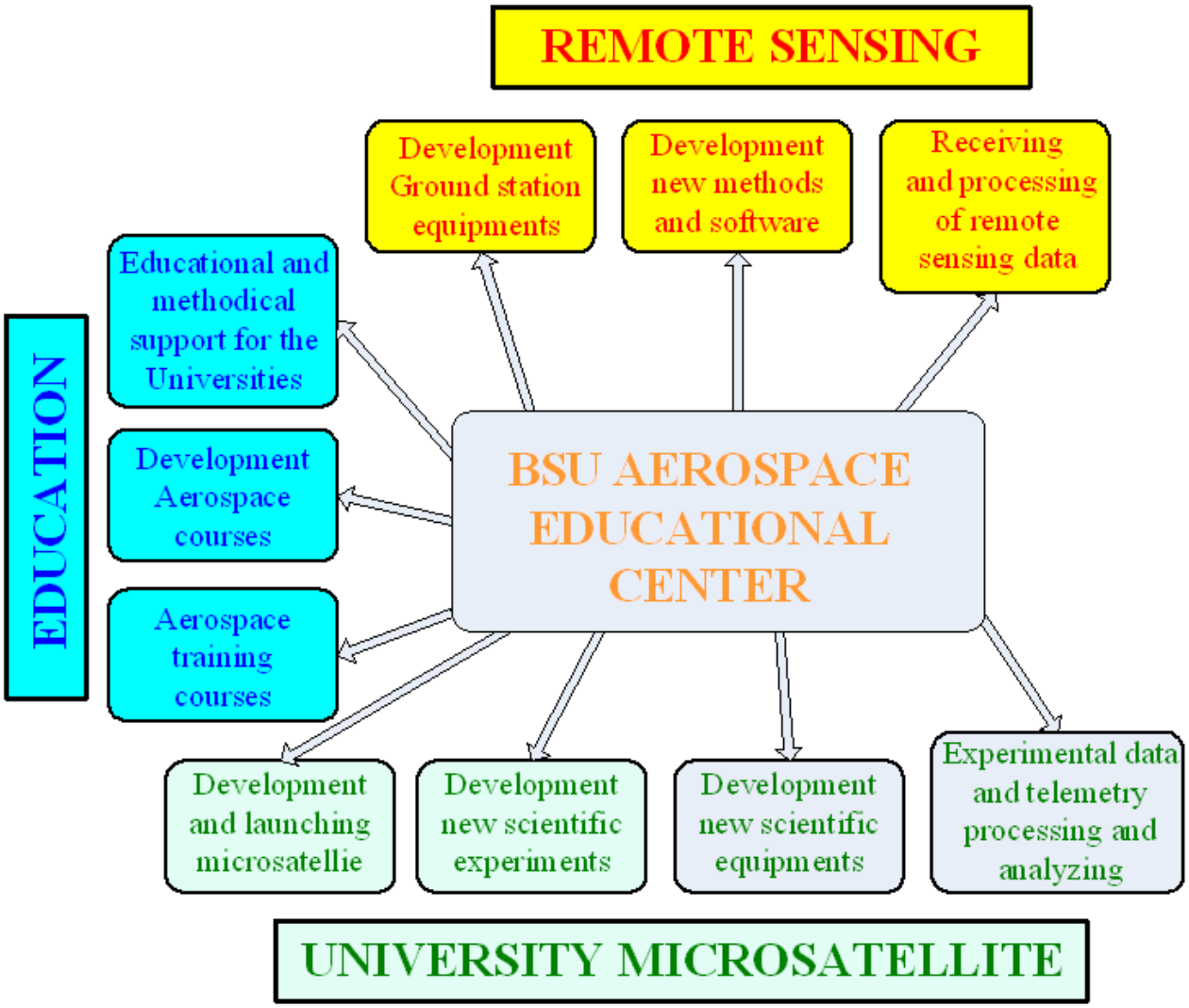
2008 – BSU the Aerospace Educational Center was founded

2009 – new educational branch “Satellite information systems and technologies” was opened

2010 – new educational department “Aerospace radio electronics and information systems and technologies” with branches:

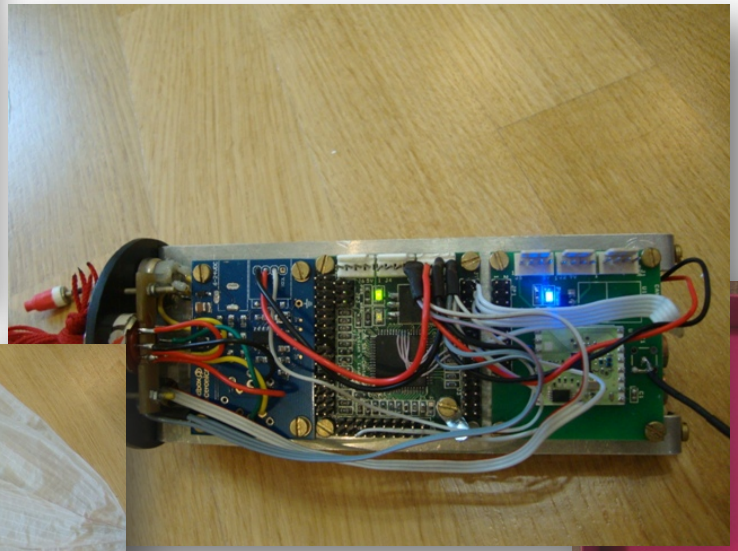
- “Global navigation and telecommunication systems”
- “Radio electronics systems for data transmission and data processing”
- “Onboard and ground information systems”

Space Education

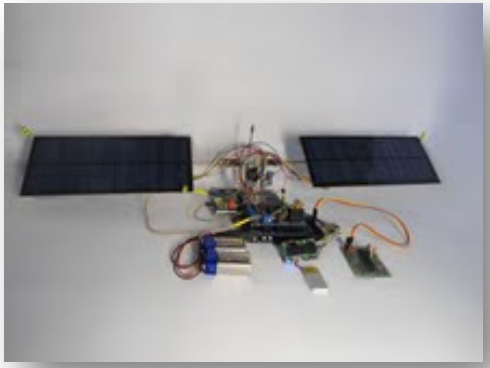


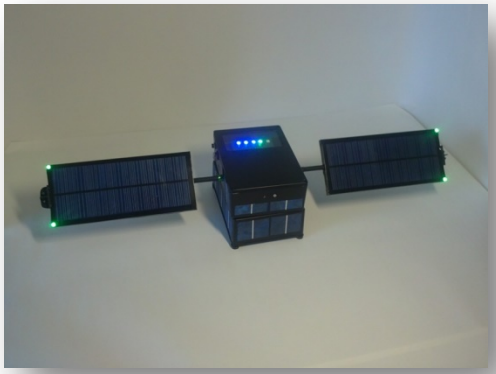
Space Education

Pico satellite «BelSat» (2012)



Space Education & NanoSats





Problems

Research:

• Study the atmospere, ionospere and magnetosphere of the Earth by orbital detectors.

• Material study under zero gravity and radiation.

Technological:

• Development and studying the technology of image transfer through channels of satellite communication.

• Development and studying orientation and stabilization systems of the nanosatellite.

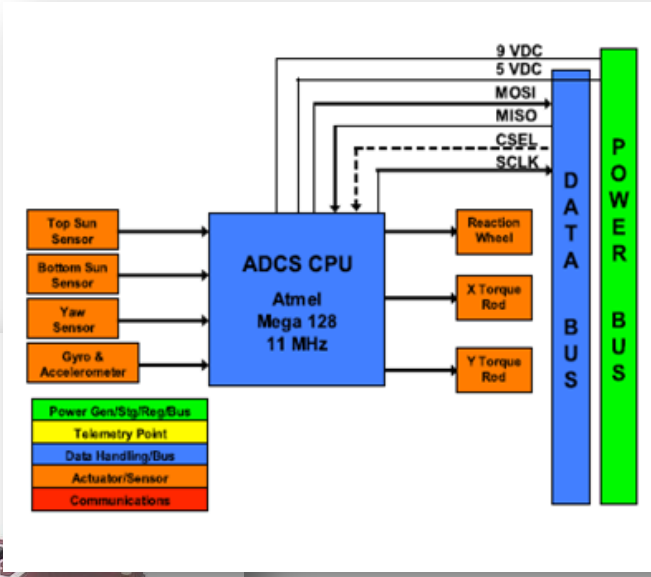
• Development and studying radio engineering and optical methods for ballistic measurements of the nanosatellite.

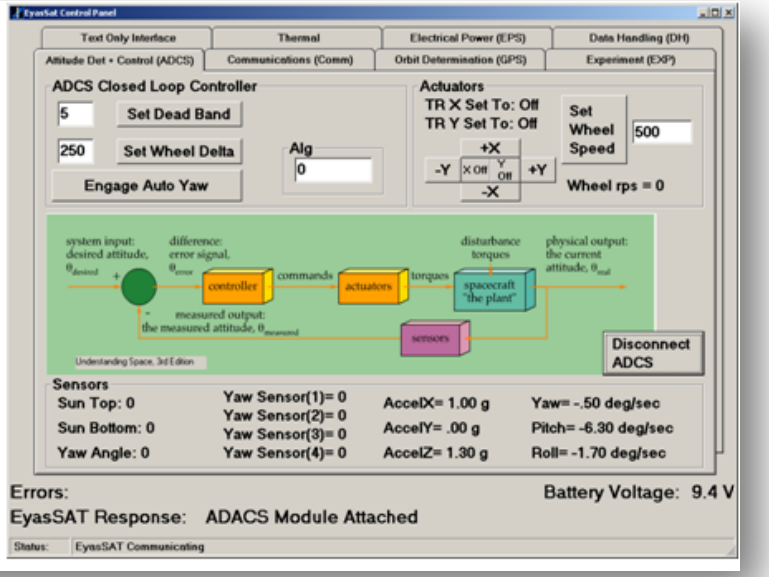
Educational:

• Development of a new approach for education of students, training of technical and engineer staff in the field of space technologies.

• Development and carrying out international university space scientific experiments.

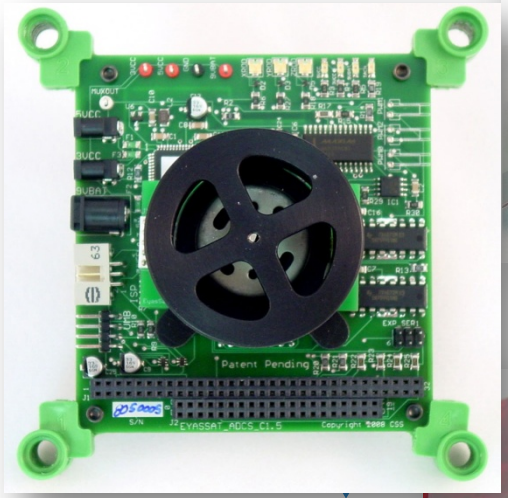
Space Education & NanoSats

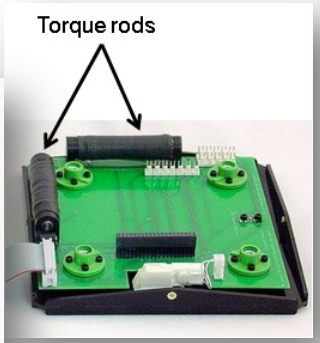


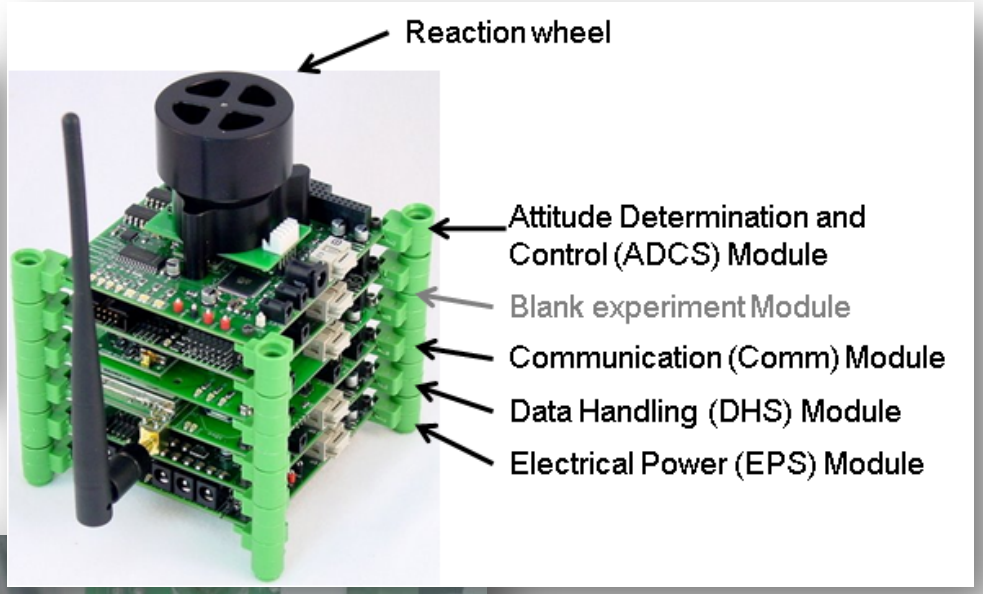


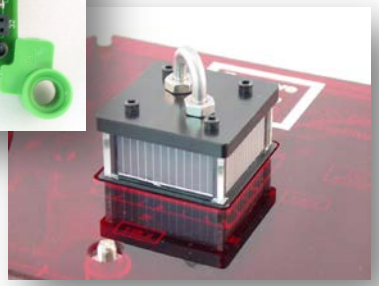
CubeSat nanosatellite exercise machine

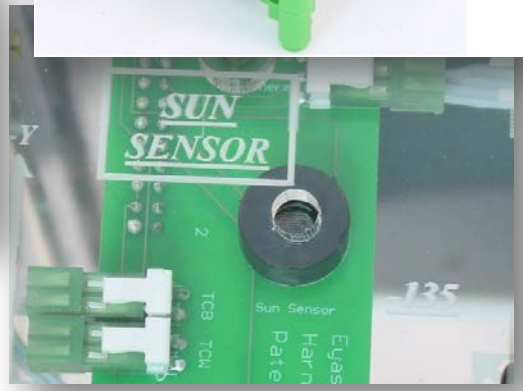
Laboratory exercise machine of the CubeSat format Orientation and stabilization system











National Space SubProgramme for 2016-2020

In order to consolidate the scientific and technical and industrial potential of the country to meet new challenges further development work in the field of space activities planned under **SubProgramme 7, "The exploration and use of outer space for peaceful purposes" in the 2016-2020** in the framework of State Programme "High technologies and equipment" on 2016-2020 years, formed pursuant to the Order of the Prime Minister of the Republic of Belarus.

The project is enabled to create a new perspective Belarusian Sattellite with a spatial resolution of less than 1 meter (preliminary in 2017)

Belarusian Activities & Priorities in Space Research

Space activities in the country will be developed in the following main perspective directions:

1. Further development of the Belarusian Earth Remote Sensing System;
2. The development of navigation, geodetic and mapping activities based on space technologies;
3. Further creation and development of human resources, scientific and technological, organizational and legal support of space activities in the Republic of Belarus

Expected Output

- An integrated the Belarusian Earth Remote Sensing System of the Republic of Belarus, using the space (including the orbit groups), aerial and ground sensing and Earth observation systems;
- Targeted information and program-technological facilities for remote sensing and to produce geospatial information for government and stakeholders;

Expected Output

- The new Belarusian space remote sensing Satellite with improved characteristics;
- Hardware, software and simulation complexes for ground tests of remote sensing and software tools for flight testing, maintenance of means of remote sensing in orbit;
- Low mass and dimension samples of perspective onboard target and scientific equipment with low power consumption (less than 300 watts) and weight (less than 50 kg) focusing on the use of the composition of small devices to ensure the creation of advanced aerospace monitoring tools

Expected Output

- Hardware and software, devices, and systems designed to generate the navigation signals, identify, process, store and visualize the navigational information;
- Belarusian satellite system and precise positioning of the center to provide the information obtained using this system

Expected Output

- System of multilevel continuous professional education and training for the aerospace industry which is harmonized with the European education;
- Hardware and software systems and educating tools for training, retraining and improvement of qualified specialists in the field of space activities using modern ICT;
- The training platform and research laboratory based on Belarusian State University nanosatellite infrastructure

Expected Output

- Normative legal texts in the field of space activities and the standards for space-purpose products.
- It is also planned to develop the Law of the Republic of Belarus on Space Activities

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