SPUTNIX
BY SITRONICS

Products and solutions

Our solutions help to create a high-tech,
safe and eco-friendly future

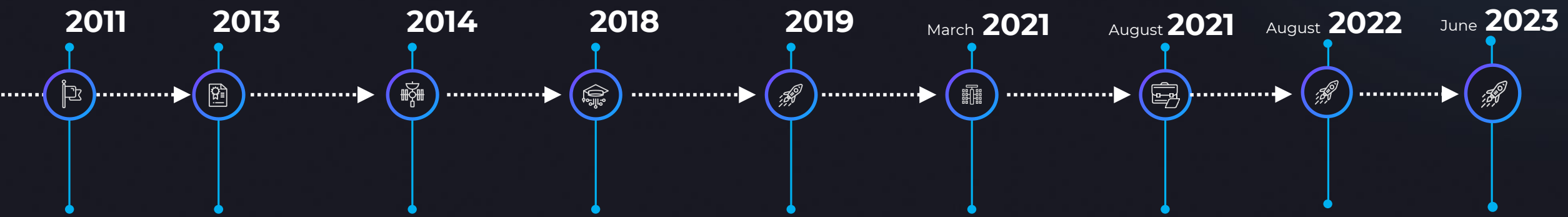
sitronics GROUP SPUTNIX BY SITRONICS

SPUTNIX
BY SITRONICS

a full-cycle company in the field of design, production of satellite devices and platforms, as well as their operation in orbit

WHO WE ARE TODAY

The leading developer and supplier of small spacecraft (micro- and nanosatellites)



COMPETITIVE ADVANTAGES

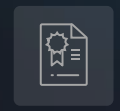
High speed of spacecraft manufacturing at low cost of production and launch

Diversified commercial application of spacecraft and unique industry experience

projects with RC Sirius, navigation monitoring, climate monitoring

Removal of several spacecraft in one launch, rapid deployment and operational replenishment of the grouping

Synergy of Sitronics group companies



FSA license for space activities

Experimental, scientific and educational missions

Own product line

aerospace systems, nano-and micro-satellites, development platforms, educational platforms, space modeling systems

Import substitution trend

The possibility of implementing large and complex projects

High investment potential

MAIN ACTIVITY

KEY DIRECTION

Space devices and satellites

A full cycle of development, production, assembly of own line of on-board devices and small spacecrafts

Providing satellite data and services

The company is working on the creation of its own system for receiving satellite data (IoT, AIS, etc.) and their commercialization

Testing facilities

Own test benches for the development and testing of small spacecraft ADCS

Educational programs

complex programs for training of students and professionals on the basis of own educational equipment

Launch into orbit

Creation and launch of spacecraft in cooperation with Glavkosmos, JSC

Satellite control

Own Mission Control Center (MCC) for data reception and satellite control

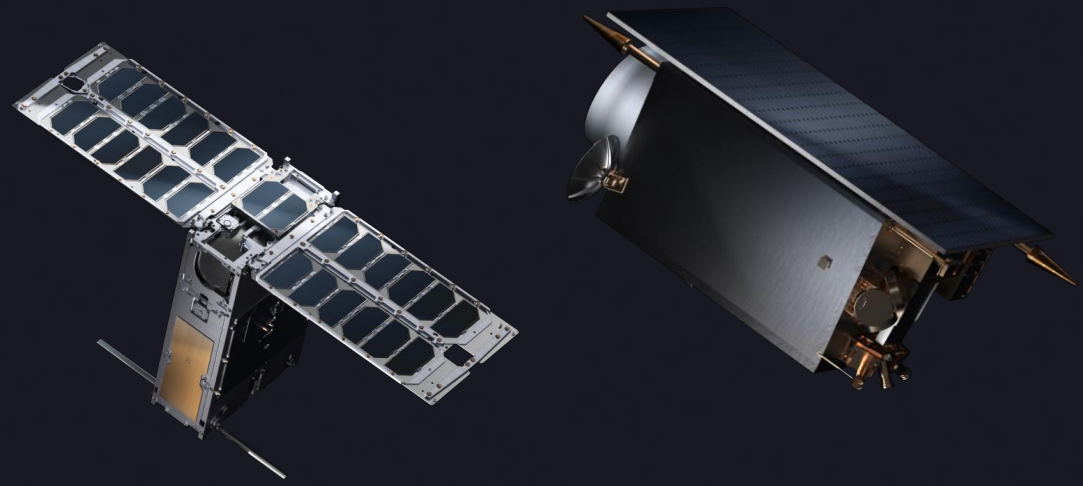
MAIN ACTIVITY

Focus on small spacecraft

The Space Division focuses on the production and operation of small spacecraft with mass from 1 to 200 kg.
Satellites in this class are capable of providing a significant part of space services of natural-resource, navigation monitoring, and data transmission (incl. IoT)

Types of satellites

- Nanosatellites from 1 to 30 kg CubeSat standard (based on platforms OrbiCraft-Pro/SXC);
- Microsatellites from 80 to 300 kg (based on platform Pallada)



SATELLITES AND DEVICES. CubeSat

TECHNOLOGIES AND MISSIONS

Space missions based on the OrbiCraft-Pro satellite platform

Since 2014:
Educational missions
Experimental missions

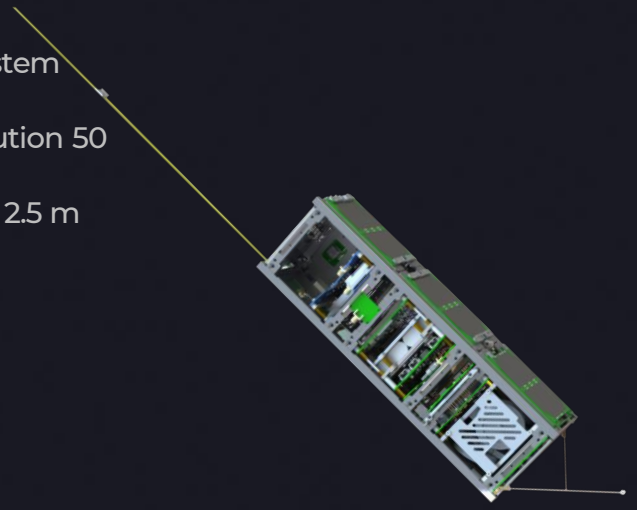
Since 2018:
Scientific missions

Since 2022:
Internet of Things (IoT)
Automatic Identification System (AIS)
Earth remote sensing: resolution 50 m (3U)
Earth remote sensing: up to 2.5 m multispectral (12U)

AIS

AIS is especially relevant for independent monitoring of navigation along the Northern Sea Route and inland waters

Launch of 5 test spacecraft – August 2022

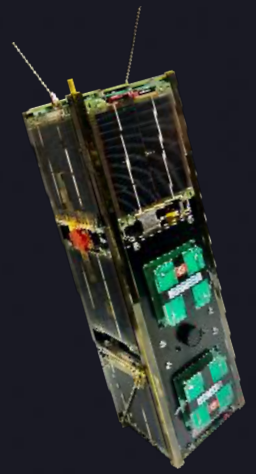


IoT

The test satellite is implemented using LoRa technology;

Planned constellation up to 70 spacecraft;

The first spacecraft was launched on March 22, 2021



ERS

Resolution 2.5 - 6.0 meters for shooting in PAN and MS;

High speed of spacecraft manufacturing;

Relatively low manufacturing and launch cost;

Insertion of multiple spacecraft with one launch;

Rapid deployment and rapid replenishment of the constellation;

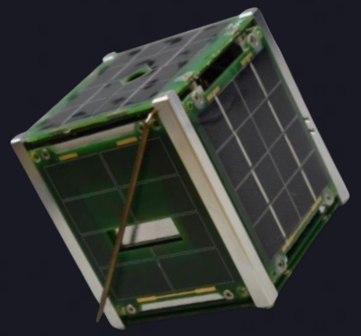
The first spacecraft was launched on March 22, 2021

SATELLITES AND DEVICES. CubeSat

SCIENTIFIC MISSIONS. OPTIONS

Monitoring of charged particles

The detection of cosmic rays or study of the "space weather". The data obtained from the detectors will be useful in near-Earth space research and in monitoring of the radiological situation. It contains a scintillator and dual photoelectronic amplifiers with a high-voltage power source.



Ionospheric radiotomography

Dual frequency transmitter (150 MHz and 400 MHz)

The transmitter was developed by scientists of the Space Research Institute of the Russian Academy of Sciences.

Launching CubeSat to the Moon

Launch of two low-cost CubeSat 6U scientific spacecraft in Russian scientific missions (Luna-26, Luna-27) to the Moon or to the Lagrange point. Small devices expand the capabilities of the Russian lunar science program.

SATELLITE DATA AND SERVICES. CubeSat

Earth Remote Sensing. OrbiCraft-Zorkiy

PARAMETERS	OrbiCraft-Zorkiy	Zorkiy-2M
Type	CubeSat – 6U	CubeSat – 12U
Mass , kg	8,5	24
Orbit altitude, km	550	400
Weight of optoelectronic equipment (OEE) kg	2,7	12
OEE name	ОЭК-803113П	ОЭК-913034
Number and type of spectral channels (PAN– panchromatic, MS – multispectral)	1 PAN	1 MS
Spectral bands, nm	450 – 750	450 – 520; 530 –590; 630 – 690; 760 – 900
Spatial resolution (pixel projection) in nadir, m	6	2,5
Linear resolution in nadir, m	11	4,0
Swath in nadir, km	17	9,3
Swath in nadir (taking in consideration the re-targeting), km	580	560

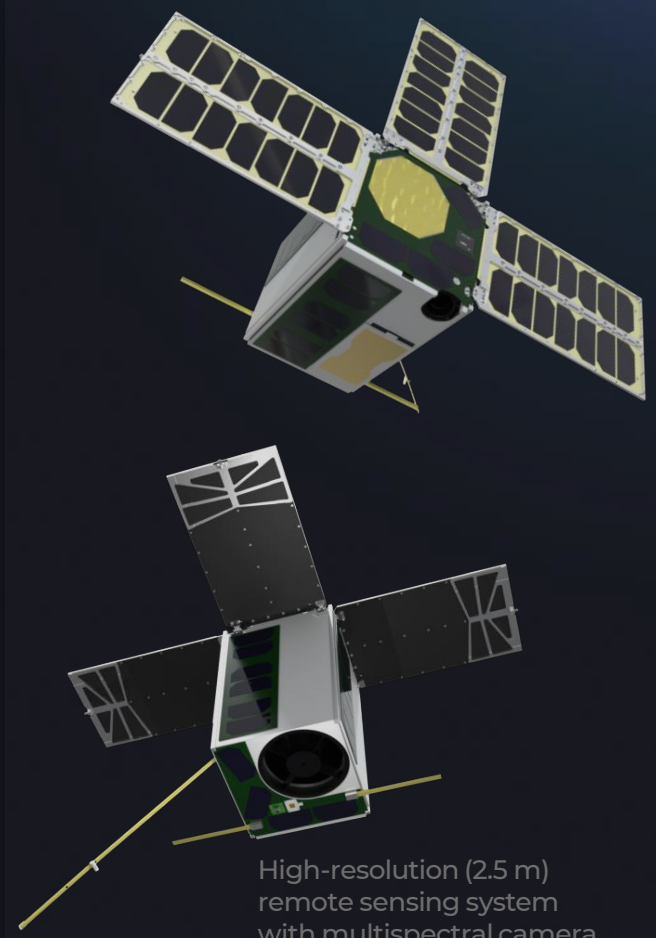
Images
from OrbiCraft-Zorkiy
Resolution 6 m

SATELLITE DATA AND SERVICES. CubeSat

ZORKIY-2M. REMOTE SENSING 12U

SATELLITE

PARAMETERS	VALUE
Type	CubeSat – 12U
Mass, kg	30
Orbit altitude, km	500
Camera mass, kg	12
Quantity of spectral ranges	4
Spectral ranges, nm	450-520 530-590 630-690 760-900
Resolution in nadir, m	2,5
Linear resolution in nadir, m	4
Swath in nadir, km	9.3 (taking in consideration the re-targeting 250 km)
Image length, km	560
Expected lifetime	3 years



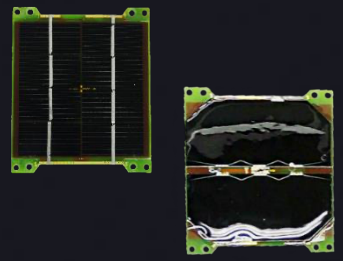
High-resolution (2.5 m) remote sensing system with multispectral camera

DEVICES. CubeSat

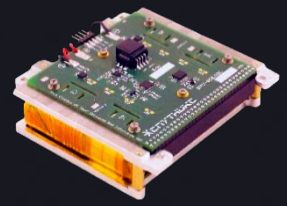
SPUTNIX produces all the main subsystems of nanosatellites, from structure to antennas, based on own developments

Made in Russia

Structure

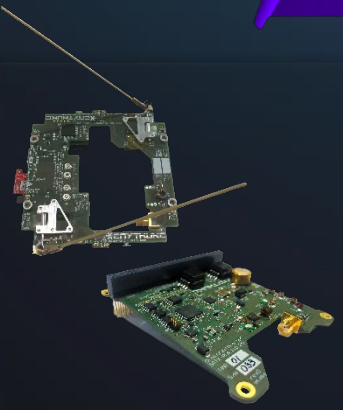


Si and GaAs solar panels



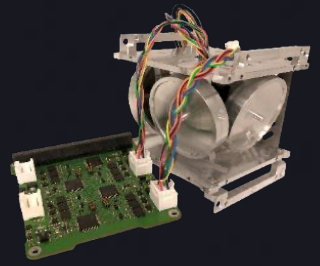
Power supply system

On-board computer

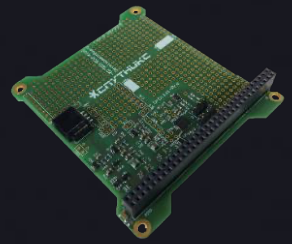


UHF transceiver

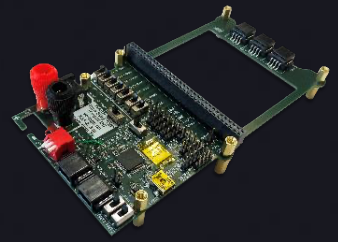
Sun sensors



Reaction wheel modules



OrbiCraft-Pro Payload Baseboard



OrbiCraft-Pro Development Kit

X-band transmitter

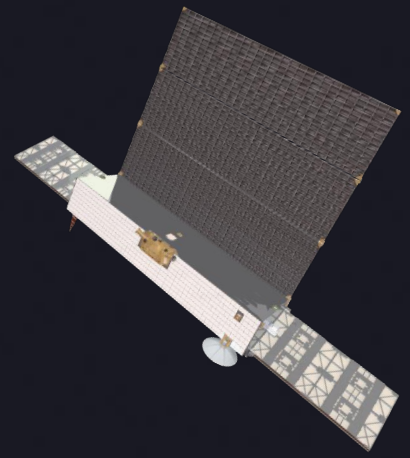
SATELLITES AND DEVICES. PALLADA

MICROSATELLITE TECHNOLOGIES AND MISSIONS

Spacecraft based on a platform with remote sensing payload.

Launch of “Kinosputnik” spacecraft based on the platform in 2024.

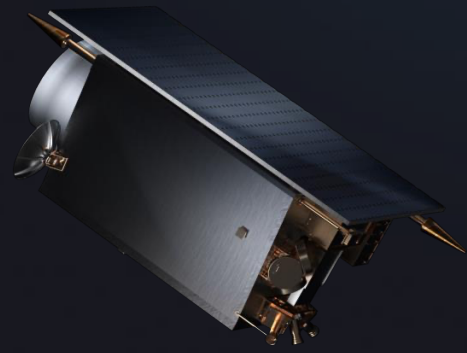
PARAMETER	VALUE
Mass, kg	Up to 160
Orbit altitude, km	500-800, LEO
Dimensions	1450x750x1210
The period of active existence	3-5 years
Spatial resolution (at 600 km)	Not worse than 1 m
Data transfer rate to the ground station	Not less than 800 Mbit/s
Stabilization accuracy	Not worse than 1 angular degree / hour



Spacecraft based on a platform Pallada with a radar payload

PARAMETERS	VALUE
Payload mass, kg	Up to 100
Frequency range	X
Maximum operating frequency band, Hz	Up to 500
Resolution, m	Less than 1
Swath, km	More than 125
Radiometric sensitivity	Not less than-18 Db (detailed frame mode)
Spacecraft performance	Not less than 18 000 km^2 /day (detailed frame mode)

Pallada – a constructive module with a functional set of service systems, developed within the framework of grant co-financing of the National Technological Initiative (NTI).



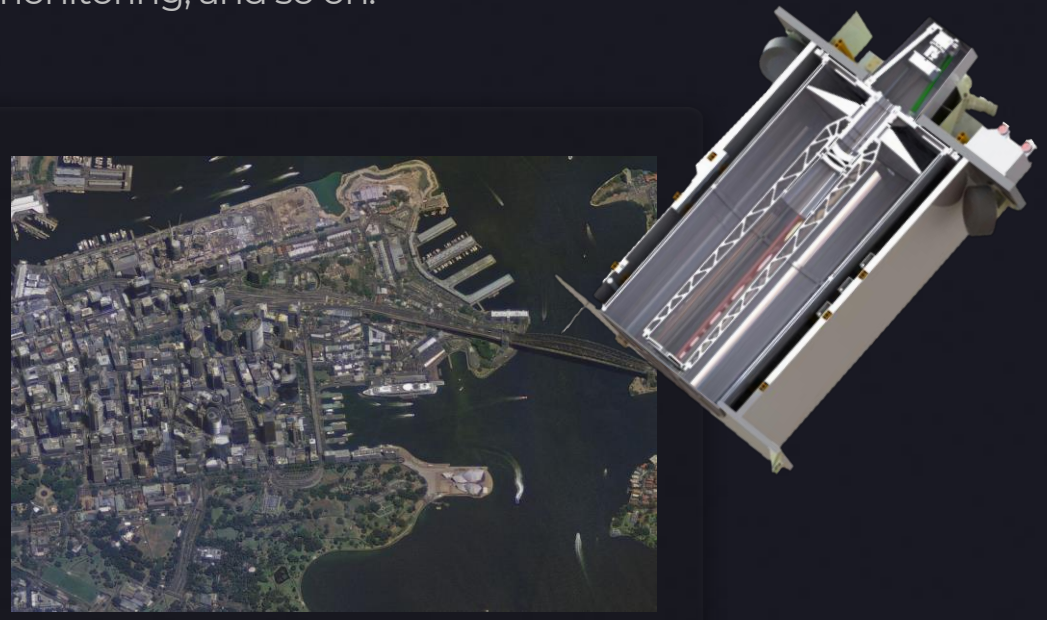
The platform ensures the placement and functioning of the payload, regardless of its design, since the layout and composition of the onboard equipment are determined based on the task.

SATELLITE DATA AND SERVICES. Pallada

EARTH REMOTE SENSING

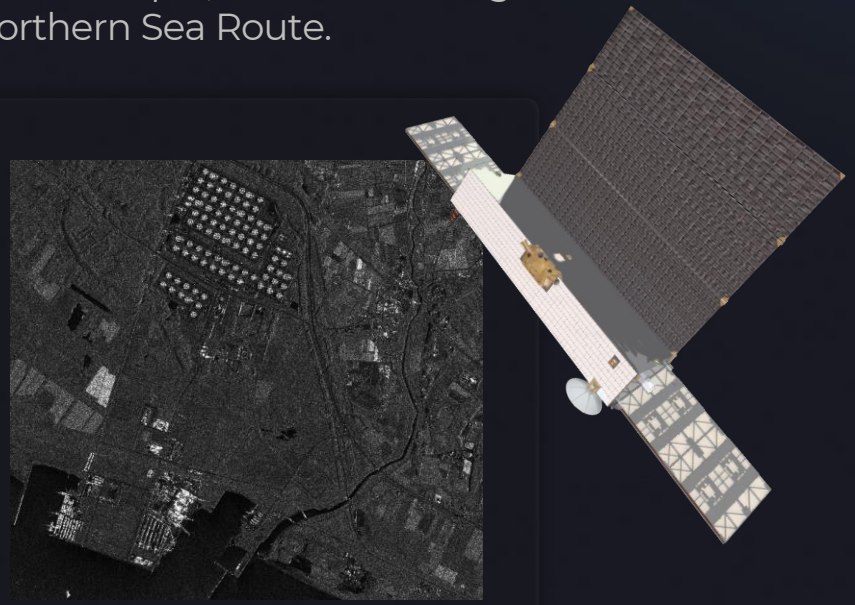
High-resolution remote sensing

The “Kinosputnik” spacecraft is the Earth remote sensing mission with a submeter (<1 m) resolution.
Its images are going to update the bank of Russian remote sensing data and to become the basis for services in the field of cartography, natural resource monitoring, and so on.



Radar remote sensing

“AtomSat” is the satellite radar remote sensing system in real time.
The system will provide independent access to radar remote sensing data in all weather conditions. The obtained data will be used, for example, in the navigation of the Northern Sea Route.

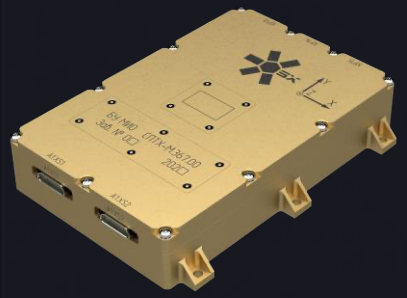


DEVICES AND COMPONENTS. Pallada

Own development

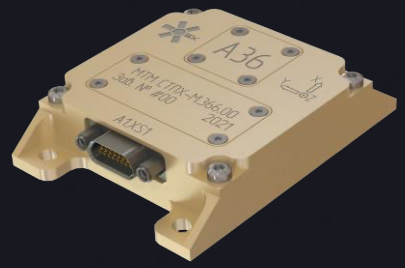
1

Made in Russia

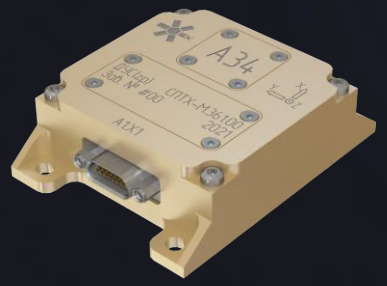


Magnetic torquers control unit

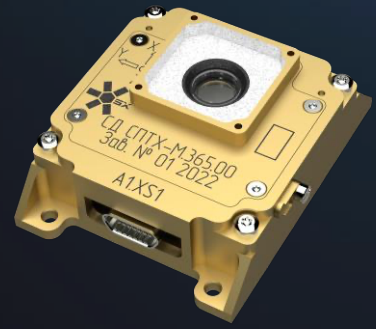
Magnetic torquers



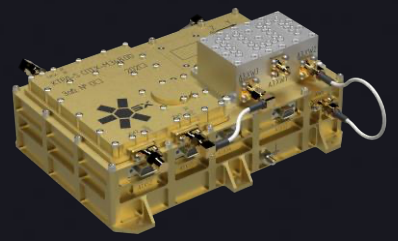
Magnetometer



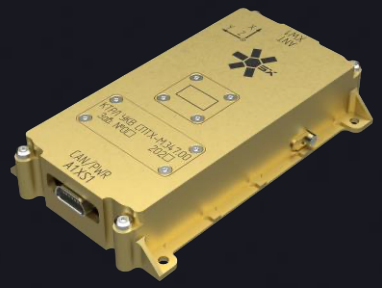
Angular velocity sensor



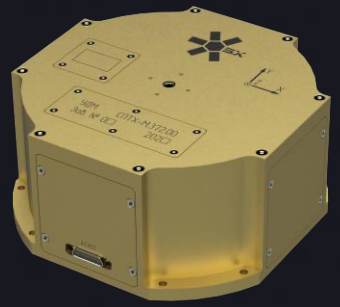
Solar sensor



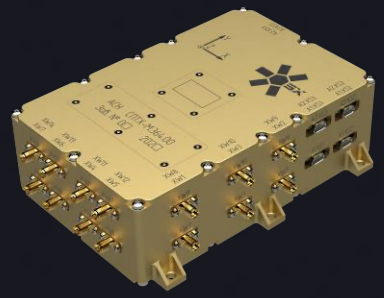
S-band TM/TC radio link



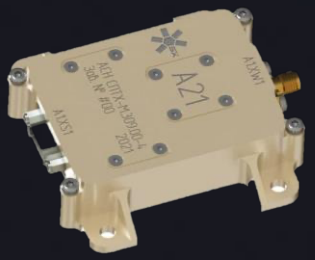
UHF TM/TC radio link



Reaction wheel



Satellite navigation equipment



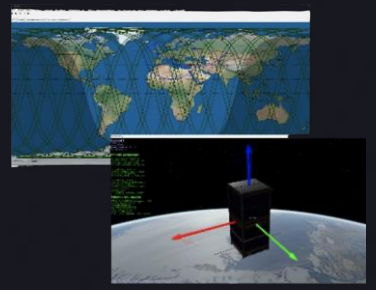
Autonomous navigation system

DEVICES AND COMPONENTS. Pallada

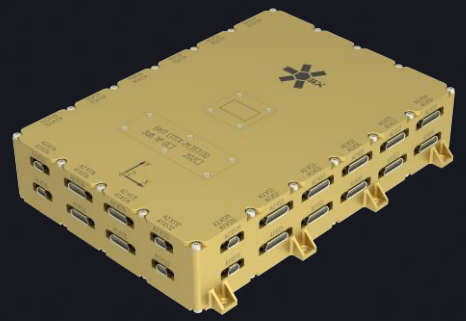
Own development

2

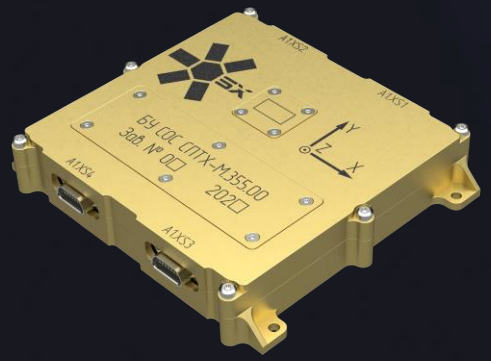
Made in Russia



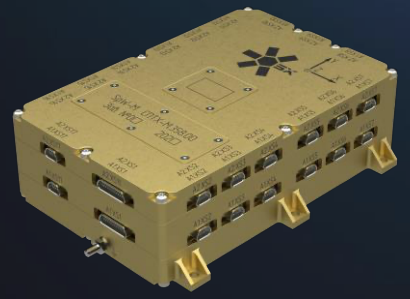
On-board software



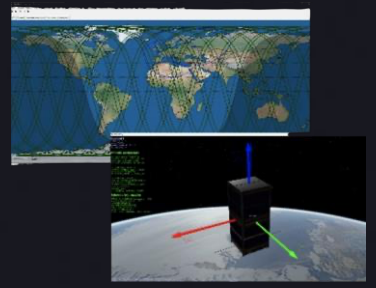
High-power distribution and control unit



ADCS control unit

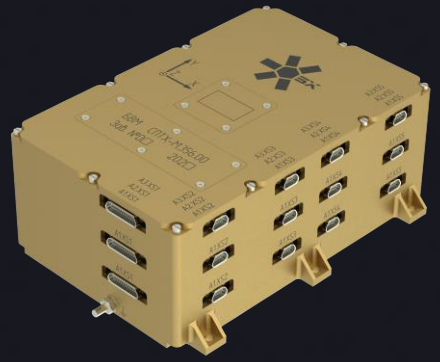


SpaceWire-router and on-board storage device of the on-board computer complex

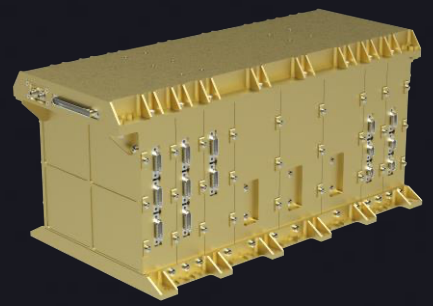


Numerical simulation software “Sputnix satellite modeler”

Antenna-feeder system of the VHF band



On-board computer



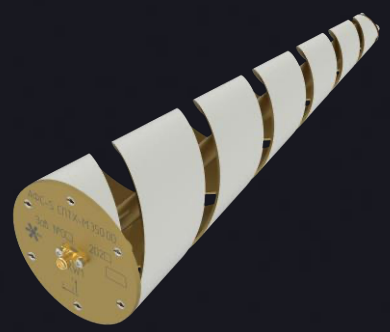
Regulation and control equipment

DEVICES AND COMPONENTS. Pallada

Own development

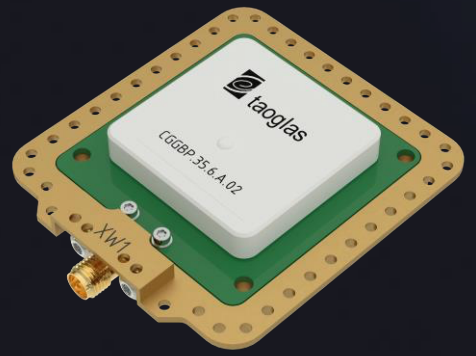
3

Made in Russia

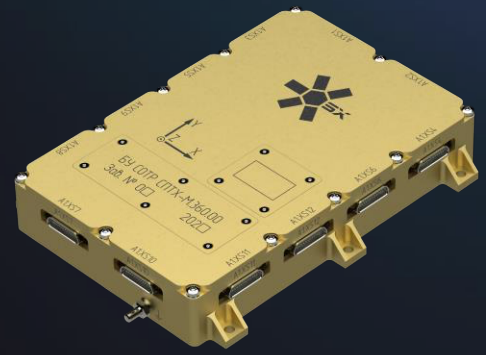


S band antenna-feeder system

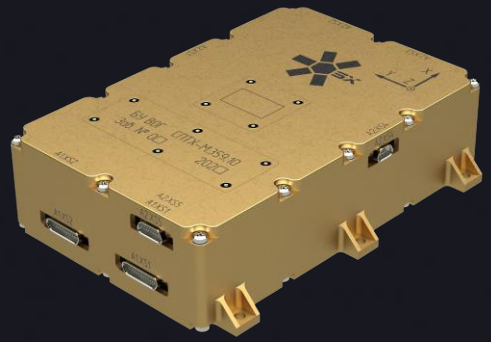
X band antenna-feeder system



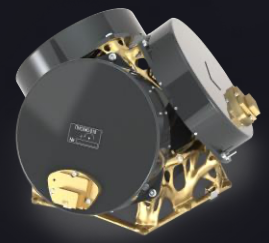
Antenna-feeder system of global navigation satellite systems



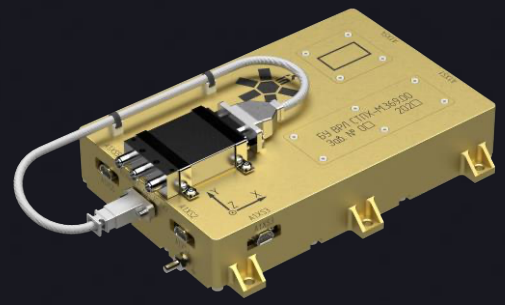
Control unit of the thermal management system



Fiber-optic gyroscope control unit



Fiber-optic gyroscope on the bracket



High-speed radio line control unit

SPACEBOX™ MICROSATELLITE DEVICES

SPACEBOX ™

Standardized set of serial onboard devices (components) and software for quick assembly of spacecraft modules.

All devices are designed and manufactured by SPUTNIX.

The optimal solution for the client: optimization of supply time and cost, unified mechanical and program interface, ready-to-use onboard architecture, which can be adapted for customer's payload.

SPACEBOX ™ 150 designed for installation on small spacecraft weighing up to 150 kg.

TEST BENCHES

Dynamic simulator for spacecraft ADCS tests

Composition of the stand

- Earth's Magnetic Field Simulator
- Sun Simulator
- Air support with movable platform (weightlessness simulator)
- Independent measurement system (determination of position in space)
- Operator's workplace
- Software

The test bench provides experiments and research of ADCS algorithms of small spacecraft in earth conditions

GROUND SEGMENT

Data reception and satellite control from own Mission Control Center

Satellite data receiving training station “Viewnok”

The following types of radio signals can be received:

- Telegraphic radio signals that allow you to receive Morse code signals "by ear" or demonstrate the Doppler effect;
- Images from NOAA, Meteor-M weather satellites, with which you can see the development of meteorological phenomena, study the temperature distribution;
- Telemetry of approximately 50 satellites to assess the altitude, temperature, and rotation speed of the satellite.

“Viewnok” includes two quadrifilar observation antennas in the bands 136...146 and 435..438 MHz, and a workstation with software.

Data receiving and satellite control station “Zavitok”

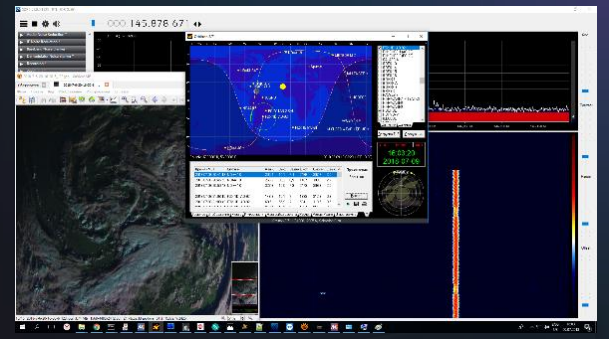
Thanks to a two-way communication channel, it is possible both to receive telemetry and data, and to transmit control commands.

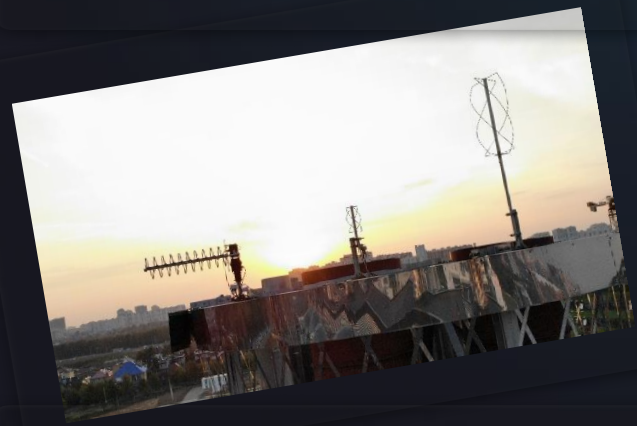
In addition to the functionality of “Viewnok” station, the complex includes a directional antenna with a satellite tracking algorithm, which allows to improve the quality of reception and transmission.

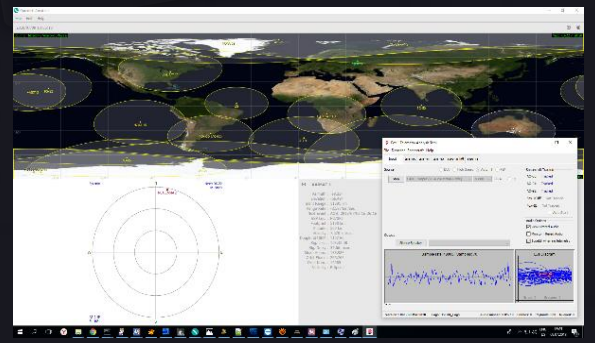
“Zavitok” station has a modification "Zavitok-M" with an improved gain due to a doubled directional antenna.

To control spacecraft manufactured by SPUTNIX, a license for a specialized software Houston CC is supplied.

“Zavitok” includes two quadrifilar survey antennas in the ranges of 136...146 and 435..438 MHz, a directional helical antenna 435...438 MHz (401...402 MHz optionally) and a workstation with software.

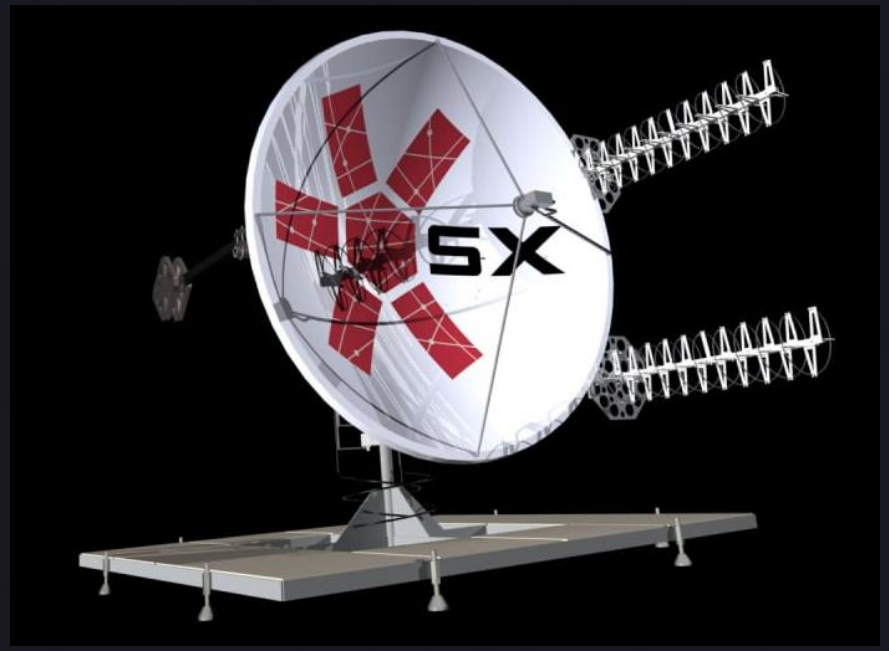


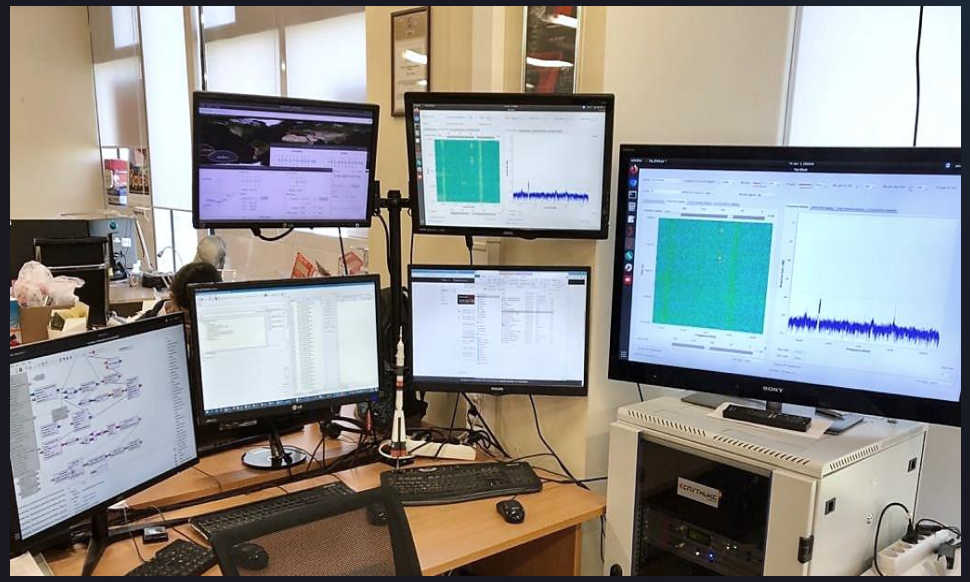




Data receiving and satellite control station “Zavitok S”

“Zavitok-S” complex is intended for use as part of flight control centers, as well as for educational use. It provides telemetry receiving from small spacecraft in low Earth orbit and control commands transmitting in UHF range, as well as payload data receiving in S frequency band. The complex is aimed to operate in accordance with amateur radio regulations but can also operate in commercial ranges.





Antenna complex contains four antennas.
Two of them are survey antennas, which are fixed quadrifilar antennas. They can be used for receiving images from meteorological NOAA and Meteor satellites, receiving telemetry from spacecraft operating in 136-146 MHz frequency range, as well as receiving telemetry from spacecraft operating in 400-440 MHz frequency range, with the elevation being limited to more than 20 ... 30 degrees, but without the need for pointing the spacecraft antenna in the sky, which is convenient in the absence of data on the orbital parameters of the spacecraft and while working with several spacecraft.

Mission Control Center (MCC)

- The Mission Control Center (MCC) is designed to provide centralized automated control of spacecraft or satellite groupings in near-Earth orbit.

The MCC conducts:

- telemetry data processing and analysis of the state and functioning of spacecraft systems
- solving ballistic problems
- planning satellite control sessions
- formation of spacecraft flight cyclograms
- visual display of satellite
- status data exchange with ground stations

- The MCC receives all information from ground control stations. In the MCC, incoming information is processed, analyzed and used to form flight cyclograms and control commands for satellites

Mission Control Center (MCC)

In addition, the following tasks can be solved in the MCC:

- simulation of the activities of the MCC staff during training,
- working out actions in emergency situations,
- conducting classes for students and training operators, conducting excursions,
- familiarization with the space activities of the organization

Composition:

- displays
- a set of automation
- tools software
- special spacecraft control software
- information storage system
- more than 50 m2

Professional Modification

* The image of the MCC is given for reference. The design can be different depending on the area, the configuration of the room and the design project

EDUCATIONAL PROGRAMS. CubeSat

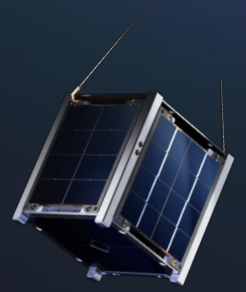
Satellite build and programming

Using OrbiCraft-Pro, it is possible to assemble and launch a satellite in a short time and at low cost into space.

The format of the construction set, the availability of all the necessary subsystems and detailed methodological materials allow even a high school student to build a satellite.

Students and schoolchildren around the world are designing CubeSat format satellites. Platforms manufactured by SPUTNIX make space even more accessible.

1U



3U

Examples of implementation

- In August 2018, SiriusSat-1,2 satellites assembled by schoolchildren at the Sirius Educational Center in Sochi were launched from the ISS (on the picture there is the project team holding the satellite).
- On March 22, 2021, the Russian educational satellites CubeSX-HSE and CubeSX-Sirius-HSE were launched on Soyuz-2 LV. They were developed by students of the HSE MIEM, students of the Sirius EC and the HSE Lyceum together with SPUTNIX engineers on the basis of the HSE space laboratories and the Sirius EC.
- Within the framework of the “Space π “ program, Russian universities, schools and satellite platform manufacturers are creating a “space fleet” of 100 CubeSat satellites.

EDUCATIONAL PROGRAMS

1

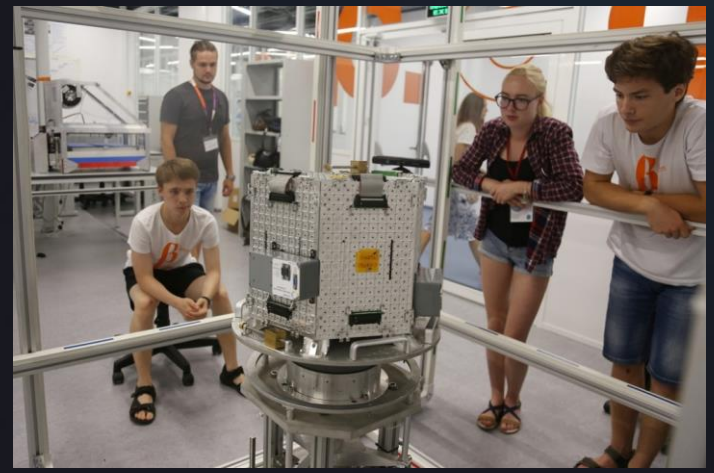
Aerospace laboratory. Complex solution

Students get skills:

- Spacecraft design and programming
- Payload development and mission planning
- Conducting tests of the spacecraft
- Working with radio: receiving telemetry and satellite images, transmitting commands
- Satellite data analysis

Application of acquired skills

- Participation in technological competitions in the field of space “On Duty for planet”, NTI Olympiad, IntERA, and in the space programs in children centers “Sirius”, “Orlenok”, “Artek”, etc.
- Participation in the WorldSkills championship, competence R54 "Space Systems Engineering”
- Launching a scientific and educational satellite into space. Participation in Space π program (Russia and Kazakhstan).



worldskills Russia

Олимпиада НТИ Кружкового движения

ДЕЖУРНЫЙ ПО ПЛАНЕТЕ

space π

EDUCATIONAL PROGRAMS

Study of satellite construction on simplified models

OrbiCraft Functional Kits

- Training in the basics of spacecraft design and assembly.
- It is a set for assembling a functional satellite model, where the onboard systems are presented in a simplified form.
- Allows you to quickly get a working prototype, figure it out in control algorithms and it is easy to learn application programming in C and Python.

OrbiCraft

OrbiCraft 3D

Complex of space environment simulators "Terra"

- Together with “Terra” complex, you can simulate a space flight;
- A large rotating globe of the Earth to simulate the orbital motion of a satellite;
- The magnetic frame creates a magnetic field around the satellite;
- The spotlight simulates the Sun light;
- The elements on the globe surface simulate the work of ground-based FCC;
- The "Virtual MCC" software visualizes radio coverage areas for satellite control.

Ready-made lessons are posted on orbicraft.sputnix.ru and orbicraft3D.sputnix.ru .

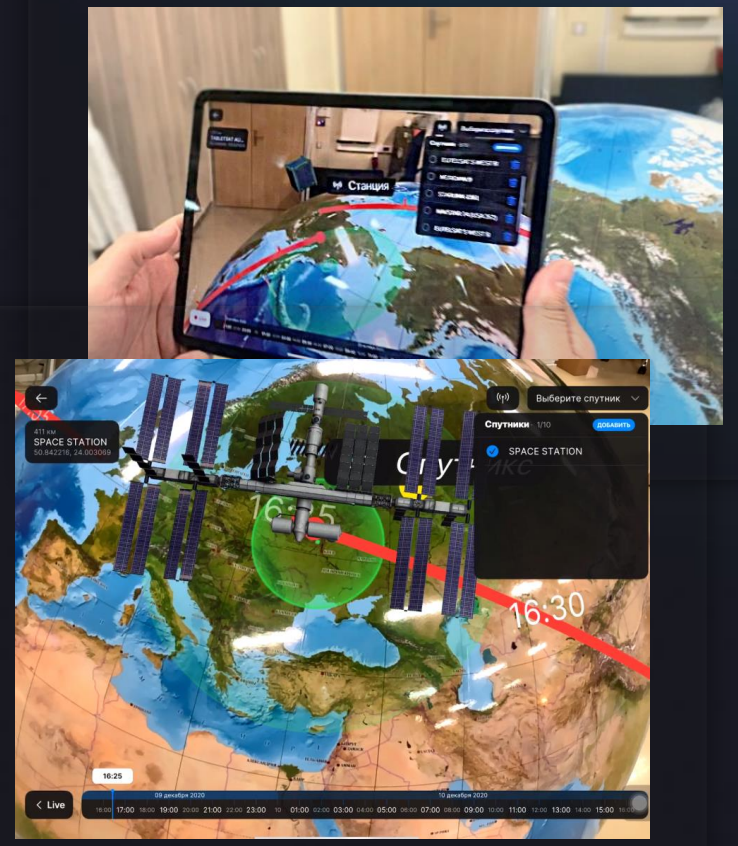
EDUCATIONAL PROGRAMS

Augmented reality (AR) hardware and software complex (tablet + SW)

AR functionality

- Satellite flight visualization displaying satellites in orbit by their Norad-ID number
- Displaying the orbit of the selected satellite, the satellite's visibility zone
- Visualization of the receiving station by its coordinates (with the name)
- Visualization of the remote sensing process (based on the Meteor-2 satellite)
- Visualization of the Earth's magnetic field shape
- The relative position of the axis of the magnetic field and the axis of rotation of the Earth
- Brazilian and Cape Town magnetic anomaly
- Van Allen Radiation Belts
- Visualization of Kepler elements of the orbit (with the possibility of their interactive modification)
- Semimajor axis, inclination, ascending node, eccentricity, perigee, apogee (pericenter, apocenter); argument of the pericenter (or longitude of the pericenter); true anomaly
- Visualization of the main types of orbits near the Earth: circular, elliptical, parabola, hyperbola; sun-synchronous orbit, polar, lightning

A large layer of lessons on orbital ballistics: Keplerian elements, TLE, the connection of the latitude of the cosmodrome with the inclination of the orbit, etc.

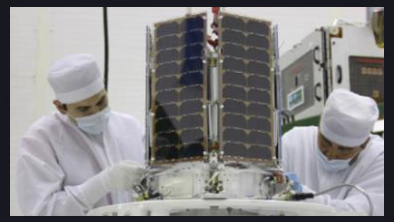


Ready-made lessons are posted on www.ar.sputnix.ru

LAUNCHED MISSIONS

Chibis-M

Mass – 34.4 kg
Purpose – Scientific sat
Launch date – January 25, 2012

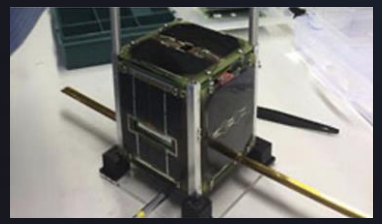


TabletSat-Aurora

Mass – 26 kg
Purpose – ERS
Launch date – June 19, 2014

Al-Farabi-1

Mass – 2 kg
Purpose – Ed-Tech sat
Launch date – February 15, 2017

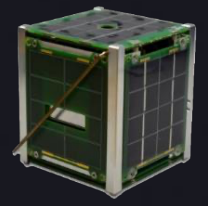


SiriusSat-1

Mass – 1.45 kg
Purpose – Ed-Scientific sat
Launch date – August 15, 2018

SiriusSat-2

Mass – 1.45 kg
Purpose - Ed-Scientific sat
Launch date - 15 august 2018



KSU-CubeSat

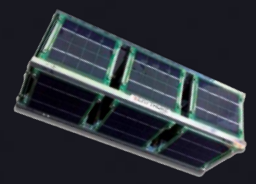
Customer – King Saud University, Saudi Arabia

Mass – 1.3 kg
Purpose - Ed-Scientific sat
Launch date - 22 march 2021

ChallengeOne, TELNET

Customer – Telnet Group, Tunisia

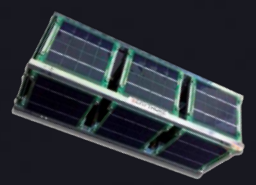
Mass – up to 4 kg
Purpose – Internet of Things (IoT), Tech Demo
Launch date – March 22, 2021



CubeSX-HSE

MIEM HSE, Russia

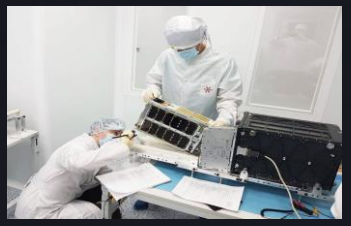
Mass – about 3.5 kg
Purpose – Tech Demo, Educational, ERS
Launch date – March 22, 2021



CubeSX-Sirius-HSE

MIEM HSE, EC "Sirius", Russia

Mass – about 3.5 kg
Purpose – Tech Demo, Educational, ERS
Launch date – March 22, 2021



OrbiCraft-Zorkiy

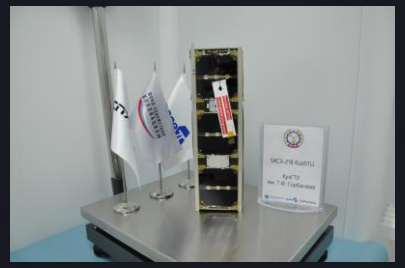
SPUTNIX, Russia

Mass – 8.5 kg
Purpose – Tech Demo, ERS
Launch date – March 22, 2021

LAUNCHED MISSIONS

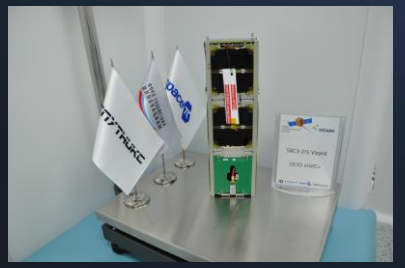
UTMN
Tyumen State University
Mass – 4 kg
Purpose – Ed-Scientific sat
Launch date – August 9, 2012

ReshUCube-1
Siberian State University
Mass – 4 kg
Purpose – Ed-Scientific sat
Launch date – August 9, 2012



SXC3-218 KuzSTU
KuzSTU
Mass – 4 kg
Purpose – Ed-Scientific sat
Launch date – August 9, 2012

CubeSX-HSE-2
HSE
Mass – 4 kg
Purpose – Ed-Scientific sat
Launch date – August 9, 2012



SXC3-215 Vizard
NIS LLC
Mass – 4 kg
Purpose – Ed-Scientific sat
Launch date – August 9, 2012

SXC3-217 Siren
BelSU

Mass – 4 kg
Purpose – Ed-Scientific sat
Launch date – August 9, 2012

SXC3-2110 Voenmeh
BSTU Voenmeh

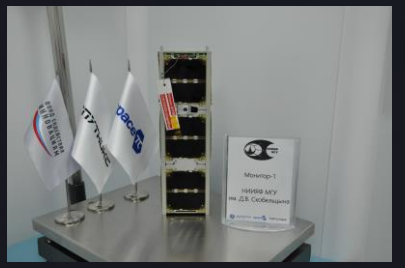
Mass – 4 kg
Purpose – Ed-Scientific sat
Launch date – August 9, 2012

SXC3-214-MIET-AIS
MIET

Mass – 4 kg
Purpose – Ed-Scientific sat
Launch date – August 9, 2012

SXC3-219 ISOI
ISOI RAS and Medex LLC

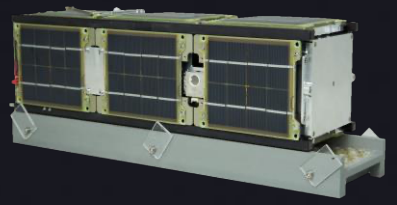
Mass – 4 kg
Purpose – Ed-Scientific sat
Launch date – August 9, 2012



Monitor-1
NIIYAF MSU

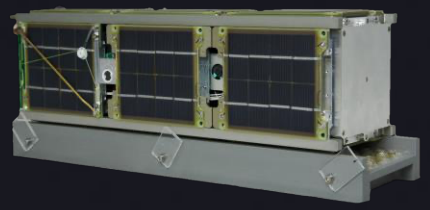
Mass – 4 kg
Purpose – Ed-Scientific sat
Launch date – August 9, 2012

LAUNCHED MISSIONS



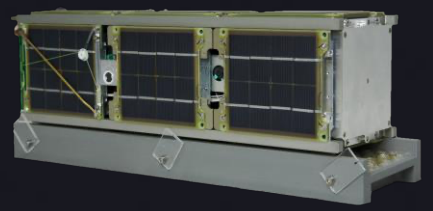
UTMN 2
Tyumen State University

Mass – 4 kg
Purpose – Ed-Scientific sat
Launch date – June 27, 2023



Monitor-3
Institute of Nuclear Physics, MSU

Mass – 4 kg
Purpose – Ed-Scientific sat
Launch date – June 27, 2023

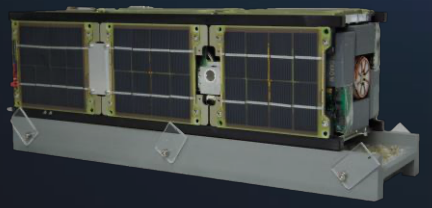


Monitor-4
Institute of Nuclear Physics, MSU

Mass – 4 kg
Purpose – Ed-Scientific sat
Launch date – June 27, 2023

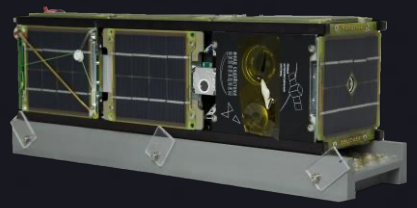
Nanozond-1
Orel State University

Mass – 4 kg
Purpose – Ed-Scientific sat
Launch date – June 27, 2023



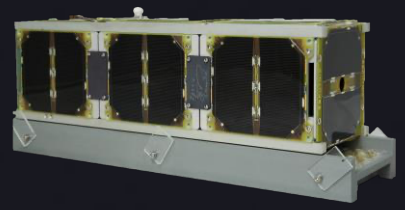
Svyatobor-1
Moscow Engineering Physics Institute

Mass – 4 kg
Purpose – Ed-Scientific sat
Launch date – June 27, 2023



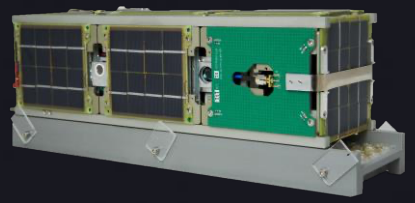
Vizard-meteo
LLC «NIS»

Mass – 4 kg
Purpose – Ed-Scientific sat
Launch date – June 27, 2023



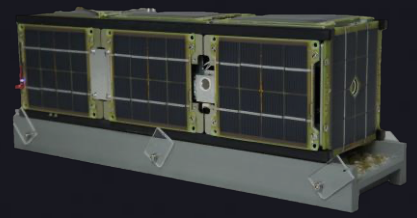
ArcCube-01
Development of education and science "FIRON"

Mass – 4 kg
Purpose – Ed-Scientific sat
Launch date – June 27, 2023



CubeSXHSE-3
HSE University

Mass – 4 kg
Purpose – Ed-Scientific sat
Launch date – June 27, 2023



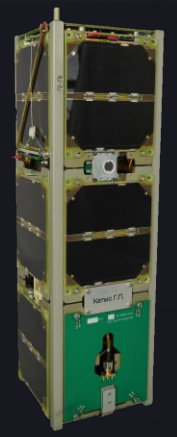
KuzGTU-1
T.F. Gorbachev Kuzbass State Technical University

Mass – 4 kg
Purpose – Ed-Scientific sat
Launch date – June 27, 2023

Umka-1
School No. 29 (Podolsk)

Mass – 4 kg
Purpose – Ed-Scientific sat
Launch date – June 27, 2023

LAUNCHED MISSIONS

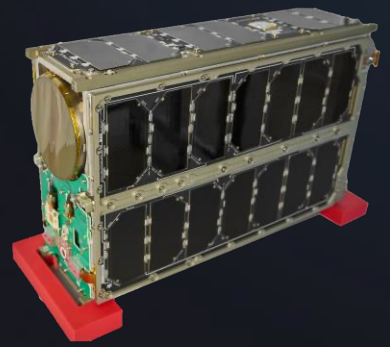


Sitro-AIS
JSC «Sitronics»

Mass – up to 4 kg
Purpose - AIS system
Launch date - June 27, 2023

Zorkiy-2M
JSC «Sitronics»

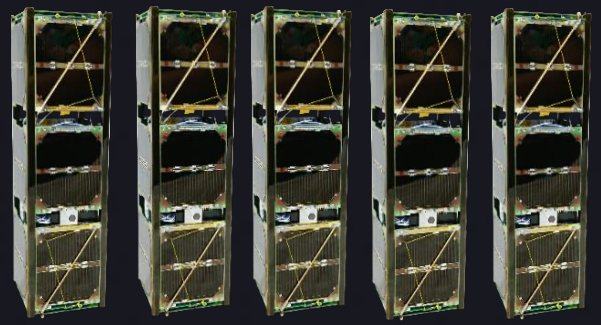
Weight - up to 20 kg
Purpose - Remote sensing of the Earth
Launch date - June 27, 2023



A-SEANSAT-PG1
Malaysia

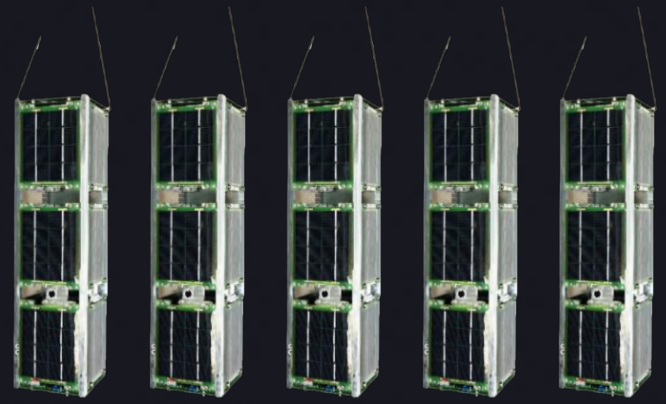
Weight - up to 10 kg
Purpose - Remote sensing of the Earth
Launch date - June 27, 2023

LAUNCH SATELLITES IN 2023/2024



AIS Satellites

Purpose – constellation of satellites of Automatic Identification System



Scientific Satellites

Purpose – Space weather, Educational-Scientific experiments

“Zorkiy-2M” Spacecraft

Purpose – Earth remote sensing (2,5 m) with multispectral camera

SPUTNIX PARTNERS