



Russian Federation experiments in IHY frame

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HISTORY AND FUTURE

1. *CORONAS-I (launched on March, 1994)*
2. *INTERBALL-1 (launched on August, 1995)*
3. *INTERBALL-2 (launched on August, 1996)*
4. *CORONAS-F'' (launched on July, 2001).*
5. *CORONAS-PHOTON - mission under development*
6. *RESONANCE - mission under development*
7. *INTERHELIOPROBE – mission under investigation*



INTERBALL MISSION

ИКИ

www.iki.rssi.ru/interball/



INTERBALL-1

Launch – 08.1995 год

- Perigee - 785 км
- Apogee - 200 000 км
- Period - 92 ч
- Inclination– 62,8

Reentry 16.10. 2000г.

INTERBALL-2-

Launch – 08.1996 год

- Perigee - 770 км
- Apogee - 20 000 км
- Period - 6 ч
- Inclination– 62,8

Lost 02. 99



RESONANCE project

www.iki.rssi.ru/resonance

***The space project is directed
to the study of
wave-particle interactions
and plasma dynamics
in the inner magnetosphere.***

Phase B of the project is supported by

Federal Space Agency

RUSSIA, FRANCE, UKRAINE, POLAND...



RESONANCE project

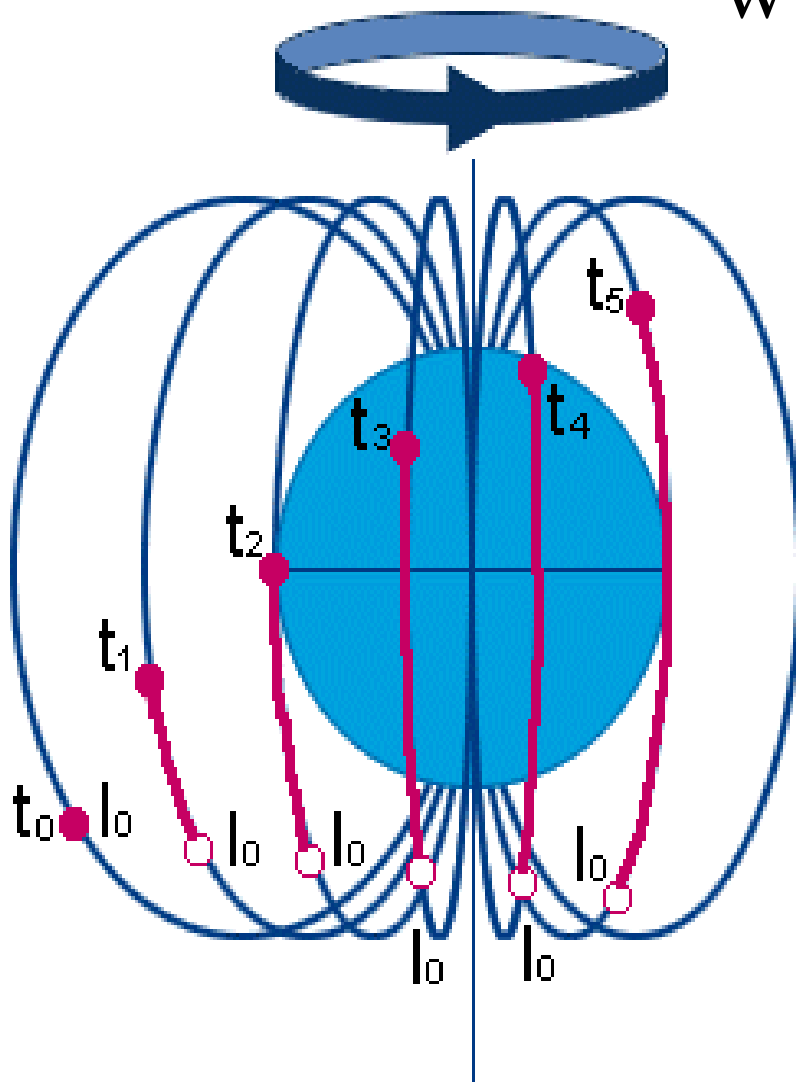


www.iki.rssi.ru/resonance

Magnetosynchronous orbit

RESONANCE satellite motion along the selected magnetic flux tube mapped of the heating station. Footprint of the selected tube will be conjugate to the ionosphere above the HF heating facility HAARP.

Satellite spends more than 3 hours in the same flux tube
($L=5.5 \pm 0.15$)



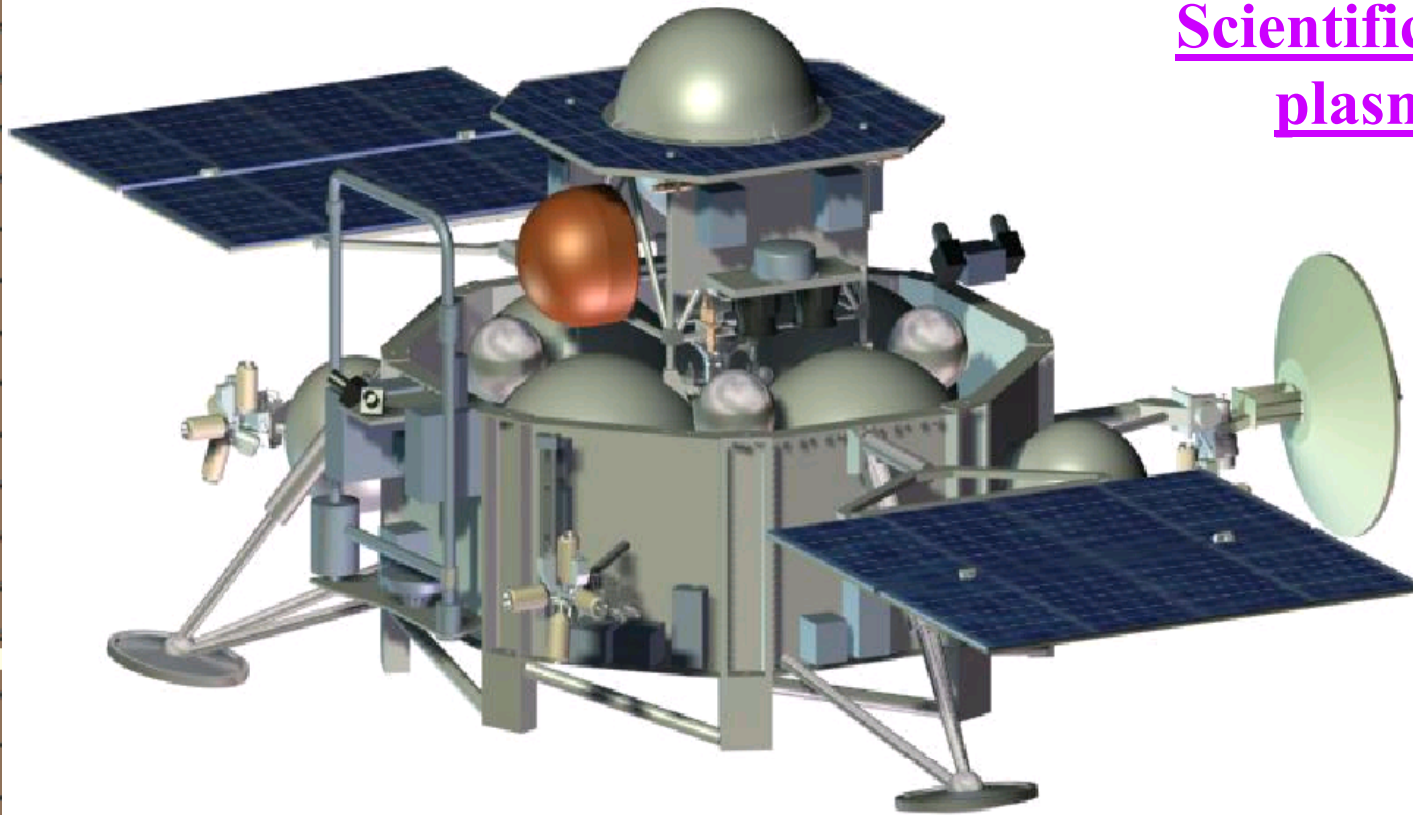


PHOBOS --SOIL

IKI

Scientific payload for
plasma studies

France
Germany
Hungary
Ukraine



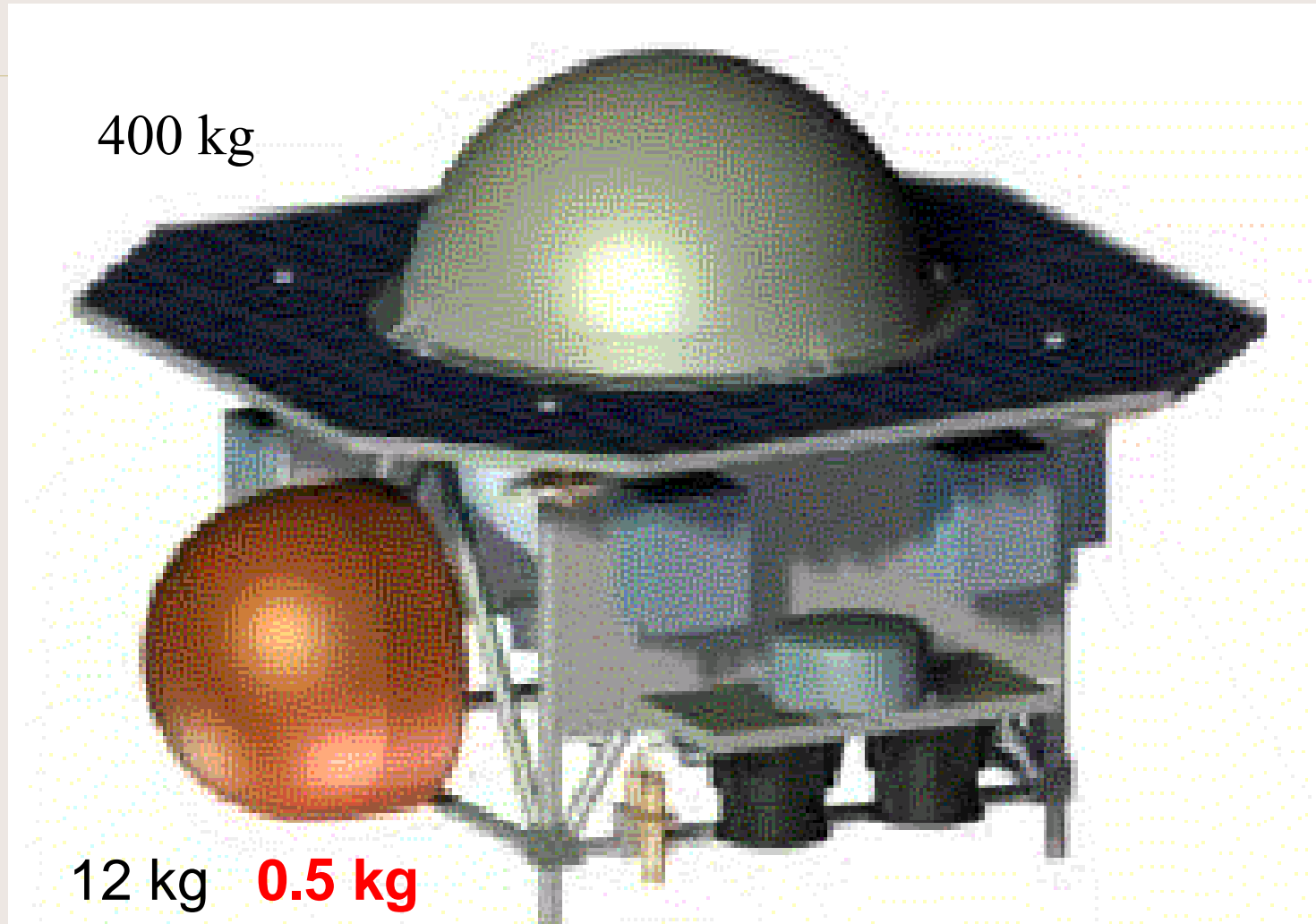
- Phobos investigation (regolith, origin and evolution of the Martian moons)
- Martian environment conditions (dust, plasma, radiation)
- Monitoring of the Martian atmosphere and surface global dynamics



PHOBOS --SOIL

Phobos regolith sample return

IKI



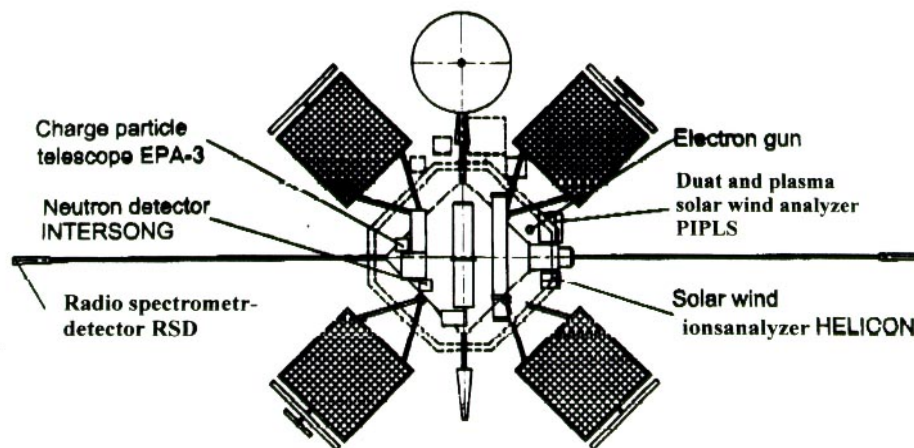
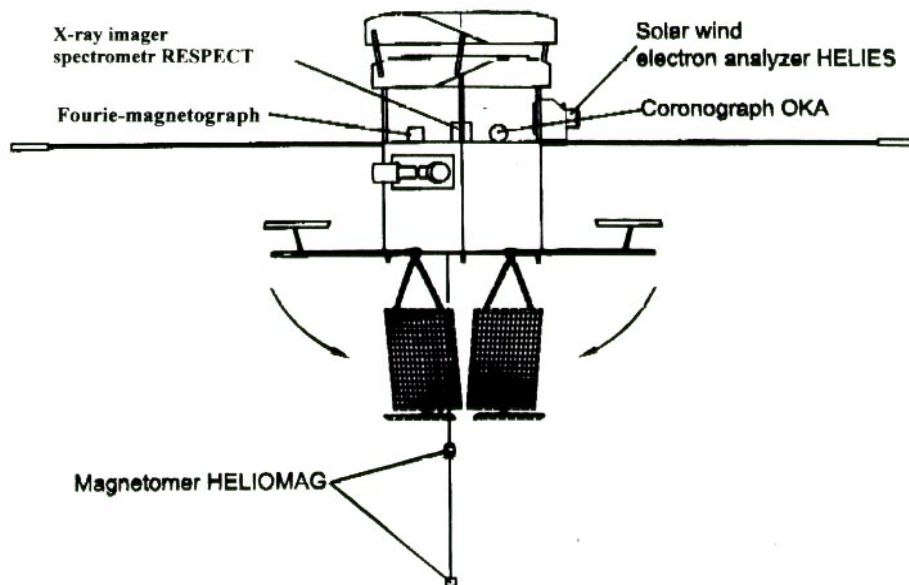


PHOBOS --SOIL

*Creation on the base of
platform "Phobos- soil" of
the space complex*

"Intergelioprobe"

*for heliophysical and gravitational
studies in the nearest environment
of the Sun.*



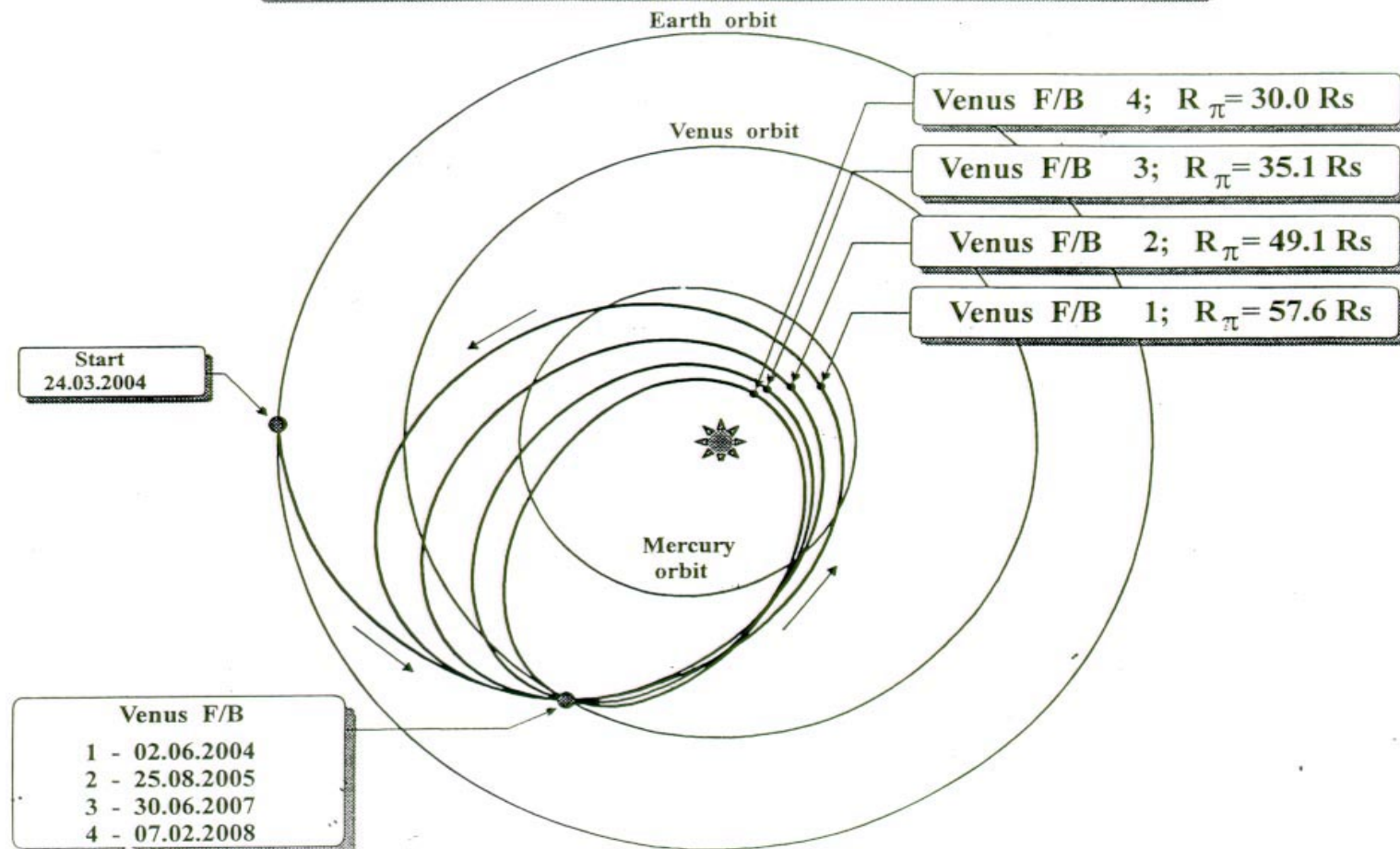
- Mass – 50-70 kg
- Power – 100W
- Telemetry – 60 kb/s

Two instrument packages

- Heliospheric instrumentation (in-situ measurements).
- Solar instrumentation (remote sensing).

Lavochkin Association

FLIGHT TO A LOW - PERIHELION ORBIT

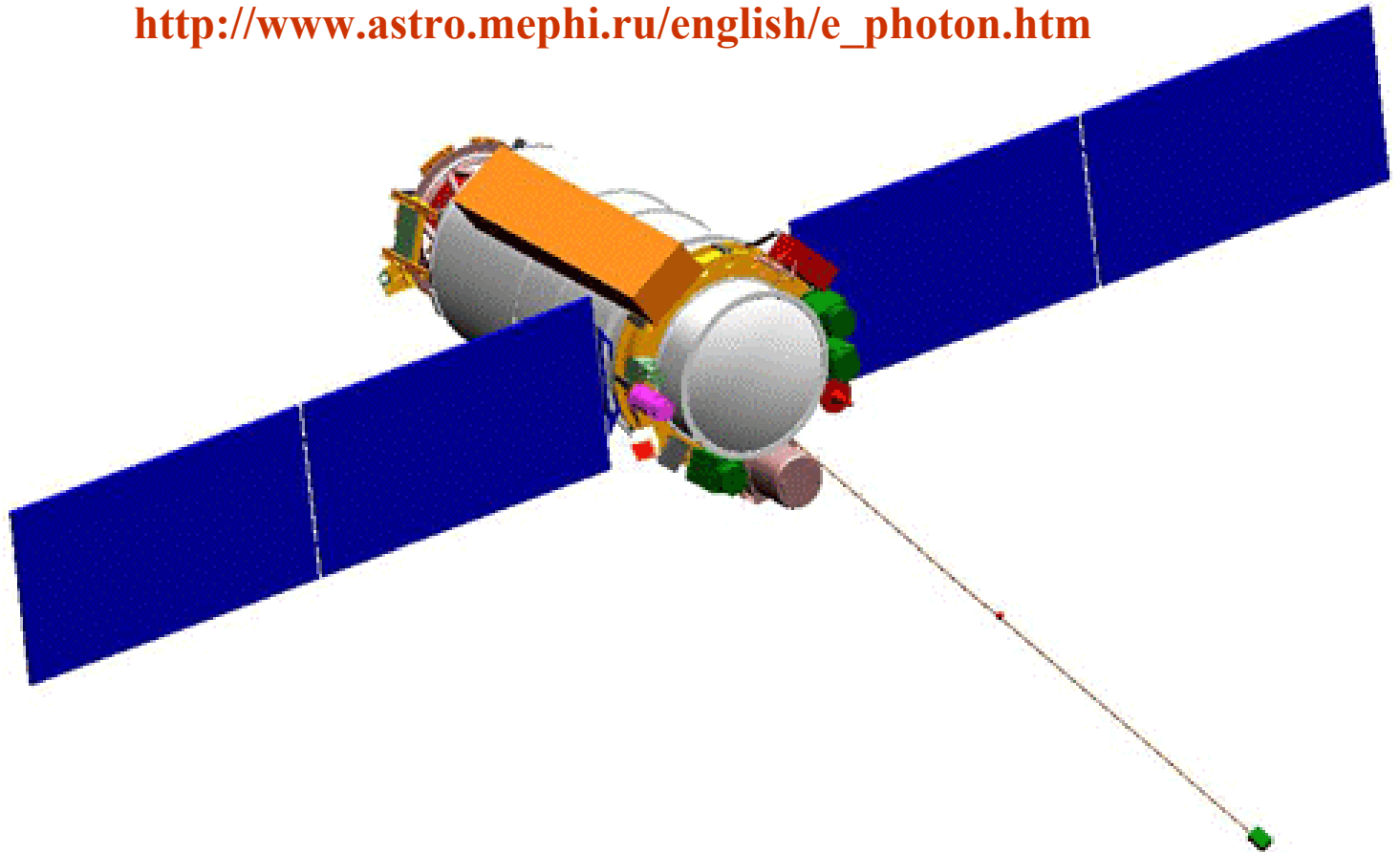


Ballistic Department



"CORONAS-PHOTON"

http://www.astro.mephi.ru/english/e_photon.htm



Moscow Engineering Physics Institute (State University)

MEPhI

The Scientific & Technical Subcommittee of the COPUOS, 43st session, Vienna 20 February – 3 March 2006



"CORONAS-PHOTON"

http://www.astro.mephi.ru/english/e_photon.htm

Is the third mission in the satellite series of the “Coronas” project (two others are “Coronas-I” and “Coronas-F”).

Goal of the project:

Investigation of the process of energy accumulation and its transformation to the energy of accelerated particles during solar flares, study of the acceleration mechanisms, propagation and interaction of the fast particles in the solar atmosphere.

Study of the solar activity correlation with physics-chemical processes in Earth upper atmosphere



"CORONAS-PHOTON"

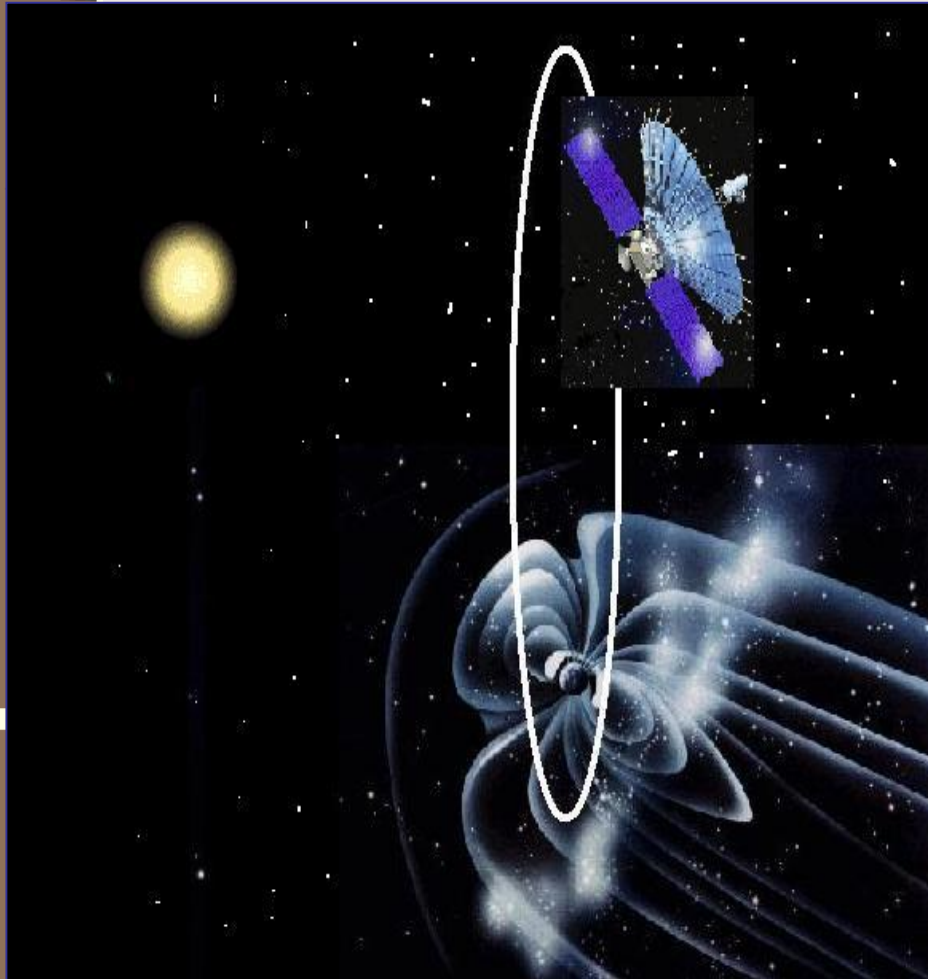
MAIN CHARACTERISTICS OF THE SPACECRAFT

Spacecraft weight, kg	1900
Scientific payload weight, kg	540
Orbit:	
• type	circular
• height, km	500
• inclination, deg	82.5
Accuracy of the spacecraft axis orientation to the Sun, arc min	better than 5
Determination accuracy of axis orientation on the Sun, arc min	3
Angular velocity stabilization of the spacecraft, deg/s	less than 0.005
Volume of scientific information stored per day, Gbit	8.2
Information transmitted during one communication session, Mbit	2048
Nominal mission lifetime, years	at least 3

http://www.astro.mephi.ru/english/e_photon.htm



Solar-terrestrial payload onboard SPECTR-R



SPECTR-R is

an International space VLBI project of Russian Space Agency.

*A 10-meter radio telescope will be launched in late **2007** to an orbit with*

apogee 350 000 km,

perigee 5 000 km

inclination 54°.

PLASMA-F is solar-terrestrial payload of opportunity onboard SPECTR-R.

Fine-scale solar wind, IMF, SCL structures:

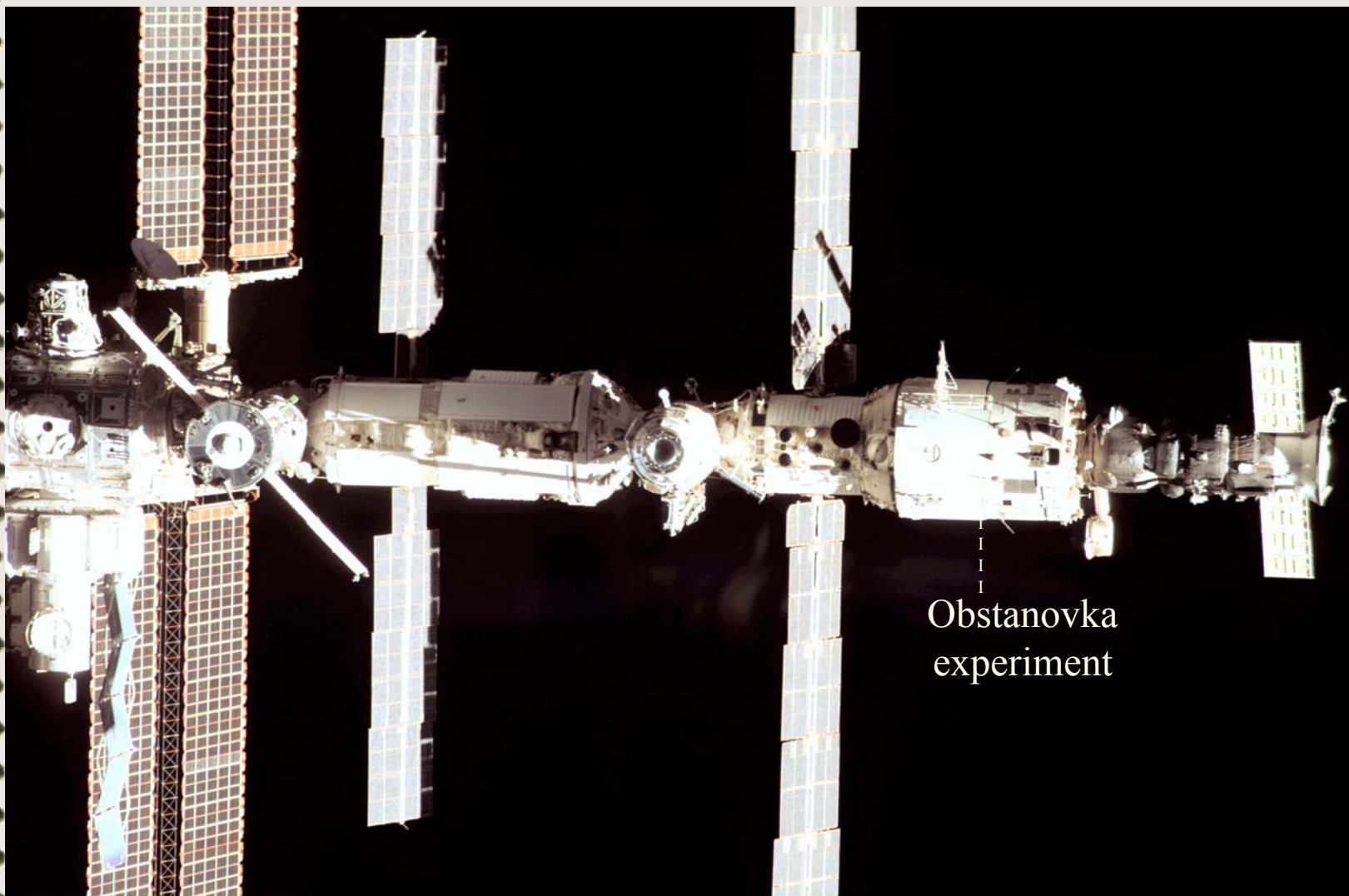
Synchronized 32 Hz measurements of magnetic field, solar wind ion density,

velocity vector, temperature, energetic ions and electrons.

Solar wind, IMF, SCL monitoring: Multi-point solar wind observations with other projects in the frame of ILWS.

***PLASMA-F with participation of
China, Czechia, Greece,
Slovakia, Ukraine.***

Experiment « Obstanovka 1-st stage » on the Russian Segment of the ISS.



PWC composition

Unit	Responsible Institute
Combined wave sensor – CWS-1, CWS-2	LC ISR, <u>Ukraine</u>
Flux gate magnetometer – DFM-1	IKI RAS , <u>Russia</u>
Flux gate magnetometer – DFM-2	LC ISR, <u>Ukraine</u>
Langmuir probe - LP-1, LP-2	STIL, <u>Bulgaria</u>
Spacecraft potential monitor - DP-1, DP-2	IKI BAS, <u>Bulgaria</u>
Plasma discharge stimulator – SPP	IKI RAS, <u>Russia</u>
Correlating Electron Spectrograph (10eV – 10KeV) CORES	Sussex University, <u>UK</u>
Radio Frequency Analyzer – RFA (Scorpion)	SRC, <u>Poland</u>
	SISP, <u>Sweden</u> ;
Signal Analyzer and Sampler – SAS3	SRG, BLE, <u>Hungary</u>
Data Acquisition and Control Unit - DACU-1, DACU-1	KFKI RMKI, <u>Hungary</u> ;
Block of Storage of Telemetry Information – BSTM	KFKI RMKI, <u>Hungary</u> ;
Grounding support equipment – GSE	KFKI RMKI, <u>Hungary</u> ;
Booms	RSC “Energia”, <u>Russia</u>
PWC integration	IKI RAS , <u>Russia</u>

The purposes of the “Obstanovka 1st stage” experiment are:

- geophysical studies of the plasma- wave processes, connected with the manifestation in the ionosphere it is solar - magnetospherically - ionospherically - it is atmospheric - terrestrial connections;
- the ecological monitoring of the low-frequency electromagnetic radiations of anthropogenic nature and connected with the global catastrophes;
- the coordinated ground observations on the influence of electromagnetic disturbances on the technogenic structures and the living organisms.

Coordinated Ground Observations Program

The development of the Program
accompanying the “Obstanovka” experiment
started in 2005

Regional planning meeting for
the Balkan and Black Sea region

(<http://www.stil.bas.bg/IHY/>)

recommended to organize
the coordinated ground observations

Bulgaria, Armenia, Azerbaijan, Croatia, Georgia, Greece,
Poland, Romania, Russia, Serbia and Montenegro and Ukraine

**Program of the Space Education,
realized on RS ISS,
was presented on the
EOEM Topical Group Meeting (ESA).**

For education purpose the part of the
physical parameters, measured onboard
spacecrafts, will be
transferred **directly to the School.**

The results of space studies are used in many applications, including the education.

Work with the schools is a natural method to inform the general public about the role and value of space studies for humanity.

**The first Russian- Australian
scientific- educational
microsatellite "Kolibri -2000"
(total mass of 20,5 kg),
on 20 March, 2002, has been injected
into orbit of International Space Station
(ISS) by separation from the transport
vehicle "Progress".**



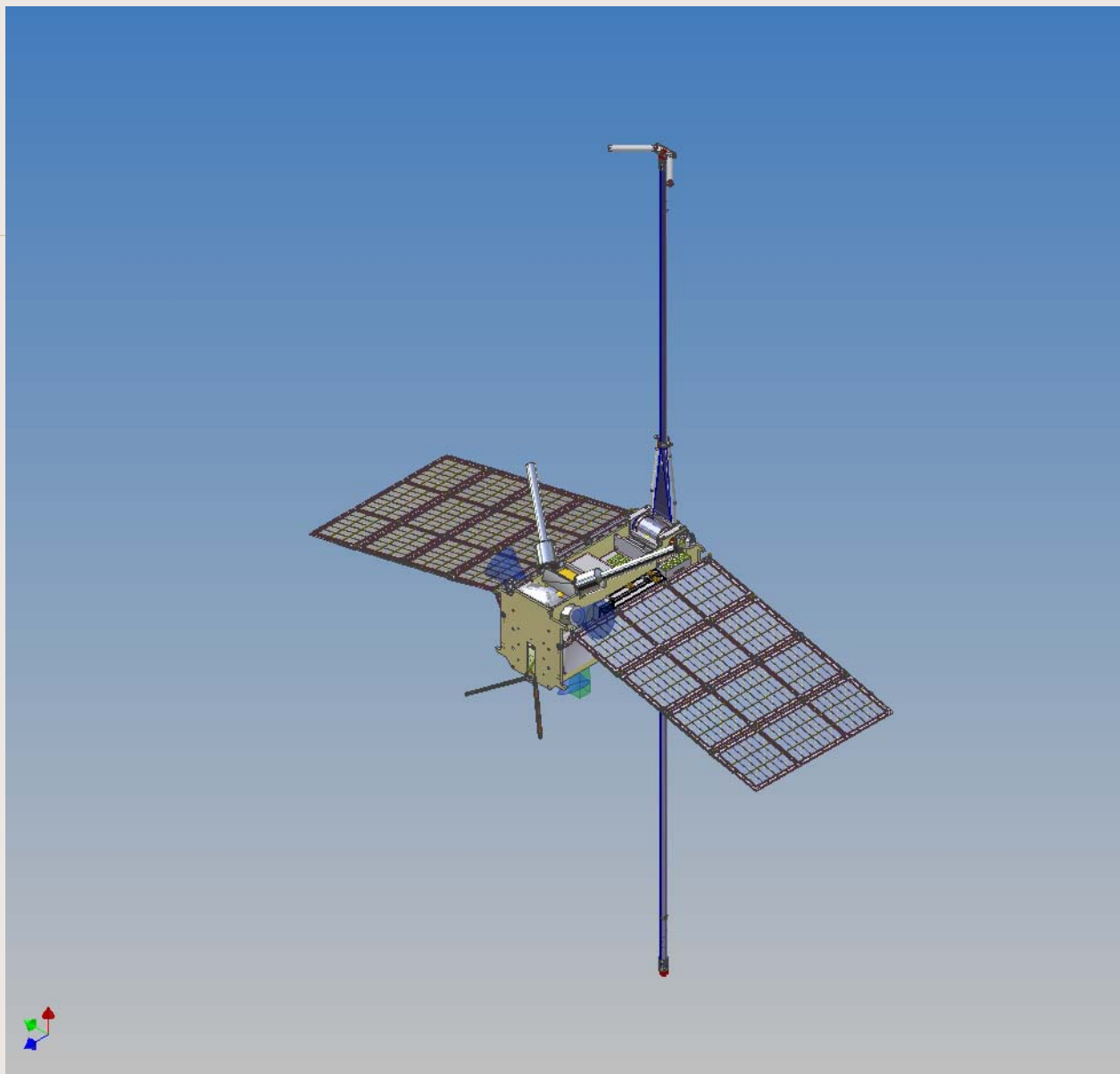
“Kolibri-2000”

It began the development of tasks for scientific- educational microsatellite (SEM).

In spite of small size, SEM had 3.6 kg of scientific payload, which provides an opportunity to carry out rather wide scientific studies both in the field of "classical" space physics and for the space weather, atmosphere-ionosphere connections etc., it serves also for the tasks of space education.

**In IKI RAN is finished the phase "A" –
is developed the model composition of
the complex of scientific instruments,
support systems,
construction of microsatellite "Chibis".**

**Microsatellite is executed with the use of an
experience of microsatellite "Kolibri-2000"**

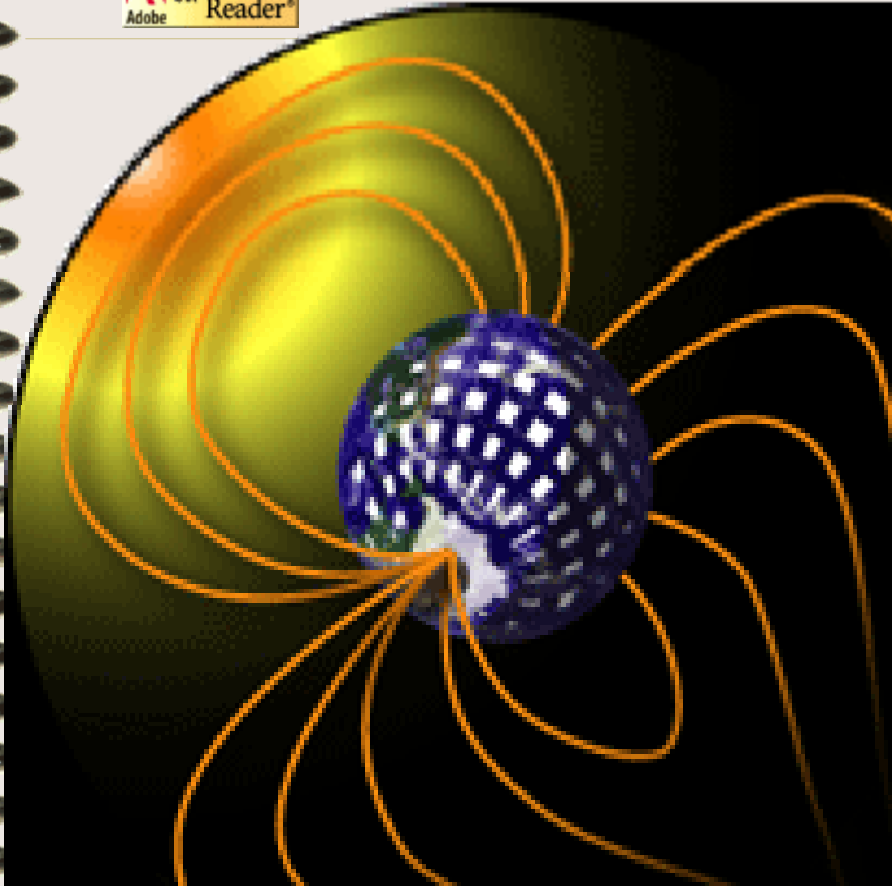


• Main technical characteristics of the micro-satellite "Chibis".

- **Mass** - 40 kg.
- Scientific instruments - 12.5 kg.
 - Service system - 18.2 kg.
 - Construction and temperature control system - 9.3 kg.
- **Orbit** - circular with the height ~ of 480 km.
- **Orientation systems:**
 - types: the electromechanical (electroflywheels) magnetodynamic (electromagnets) gravitational (boom);
 - accuracy of the determination of orientation from the sensors (starry, solar) and systems GPS - GLONASS to 2- angl. deg.
 - accuracy of guidance +/- 3 - 15 angl. deg.
- **Data-transmission system:**
 - S/C-Earth - 128 kbit/s
 - the capacity of onboard storage - 8 Mbytes
 - the volume of the adopted from the board information - ~ 50 Mbayt/day
- **The radio frequency of command and telemetering links** 145 and 435 MHz.
- **The system of onboard power supply** 50 W:

INTERNATIONAL HELIOPHYSICAL YEAR

$$2007 = 1957 \text{ (IGY)} + 50$$



In 1957 a program of international research, inspired by the International Polar Years of 1882-83 and 1932-33, was organized as the International Geophysical Year (IGY) to study global phenomena of the Earth and geospace. The IGY involved about 60,000 scientists from 66 nations, working at thousands of stations, from pole to pole to obtain simultaneous, global observations on Earth and in space. There had never been anything like it before. The fiftieth anniversary of the International Geophysical Year will occur in 2007. We propose to organize an international program of scientific collaboration for this time period called the International Heliophysical Year (IHY). IHY will focus on the problem of solar variation effects on Earth.

IHY + IPY (INTERNATIONAL POLAR YEAR)

***Thanks for the attention
Distinguished Chairman
and the respected Delegates***