

International Seminar

**“Application of space methods for studying
the problems of the health of man,
potentially dangerous and
catastrophic phenomena
with the use of the universal
micro-satellite platforms”
(Russia Federation – UN, 2007)**

**Seminar carries out
the Space Research Institute of
the Russian Academy of Sciences
(IKI RAN, Moscow)**

<http://www.iki.rssi.ru/>

**in the territory of the Special Design Bureau of
the Space Instrument Manufacture of
the IKI RAN (SDB IKI RAN, Tarusa)**

<http://tarusa.ru/skbkp1/skb.htm>

Seminar is conducted in understanding of that fact that the progress of all countries in the sphere of science, education and economy is strongly interconnected and it also contributes to the steady development of the participating countries of the United Nations.

It is especially important to note that
this Seminar is included in
the Plan of the action (2006 - 2007) of
Roskosmos and the Russian Academy of Sciences,
dedicated to the celebration of
100- anniversary from the birthday S.P.Korolev,
150- anniversary from the birthday K.E.Tsiolkovskyi
and
50- anniversary of the launching of
the first artificial earth satellite

The Program of Seminar includes the question

1. Space sciences (fundamental space physics, geophysics and ecology, aerospace biomedicine and biology).
2. Space technology (development and the manufacturing of spacecraft to use the experience of the planetary studies; the ground tests of spacecraft).
3. The use of microsatellite for space education.

The magnetosphere and the ionosphere play important role for the humanity.

One of the practical aspects of the magnetosphere are radiation belts, particles from which present danger to the man. The magnetosphere is the unique protective shield, which protects man from the penetration of the high-energy (radiation) particles of the space and solar origin.

The ionosphere, just as the atmosphere and its ozone layer, protect man from the disastrous (at the large doses) ultraviolet and X-ray radiation. The knowledge of the processes, capable of changing the state of the magnetosphere and ionosphere, i.e., "space weather", is vitally necessary for humanity. A number of these processes is determined 11- and by 22-year solar cycles, which requires respectively prolonged observations, i.e., monitoring.

The component of "space weather" are also the disturbances, which arrived in the surrounding outer space from the earth's surface and those having as natural (for example, earthquake, volcanic eruption, typhoons, and so on) so anthropogenic (industrial electromagnetic radiations and gases, technogenic catastrophes, and so on) origin.

The ejections of industrial gases penetrate from the earth to the heights of the upper atmosphere and even ionosphere, change their natural chemical composition and, correspondingly, the electrodynamic parameters of plasma.

Thus appears the task of organizing the global monitoring of disturbances in the ionosphere for purposes of averting its catastrophic changes.

One of important observed natural phenomena within Space Weather program is Earth's magnetic field (or geomagnetic field). It was experimentally shown that this influence, in particular, is observed at people with heart problems.

Holter monitoring of cardiac rhythm and arterial pressure are showed the increase at patient with Ischemic Heart Disease during the beginning of the magnetic storm.

The number of observed myocardial infarctions is correlating with the integrated time of the observation of geomagnetic pulsations of the Pc1 type, but not with the index of global geomagnetic activity Kp.

It should be noted that obtaining the statistically sufficient observations Pc1 at the geophysical observatories is hindered because of the significant level of man-made interferences.

From a number of
 the possibilities of space monitoring one
 should separately stop
 at the large role,
 which they can in the solution of this problem play
microsatellite (MS).

Actually, creation large spacecraft, which carry the wide kit of diverse physical tools, is the matter to the complex, dear, prolonged and accessible only specialized enterprises of space industry.

From other side, with the contemporary level of the development of space technology and electronics appears the possibility of development and production by the forces of scientific-research institutes comparatively small MS.

**Such MS,
which carry several kilograms of
contemporary scientific instruments,
can effectively solve
many tasks of space monitoring.**

**The development and the creation of microsatellite
is conducted for the last 7 years in IKI RAN.**

**In 2002 in orbit was delivered the
scientifically- educational microsatellite
"Kolibri-2000" (total mass – 20.5 kg).**

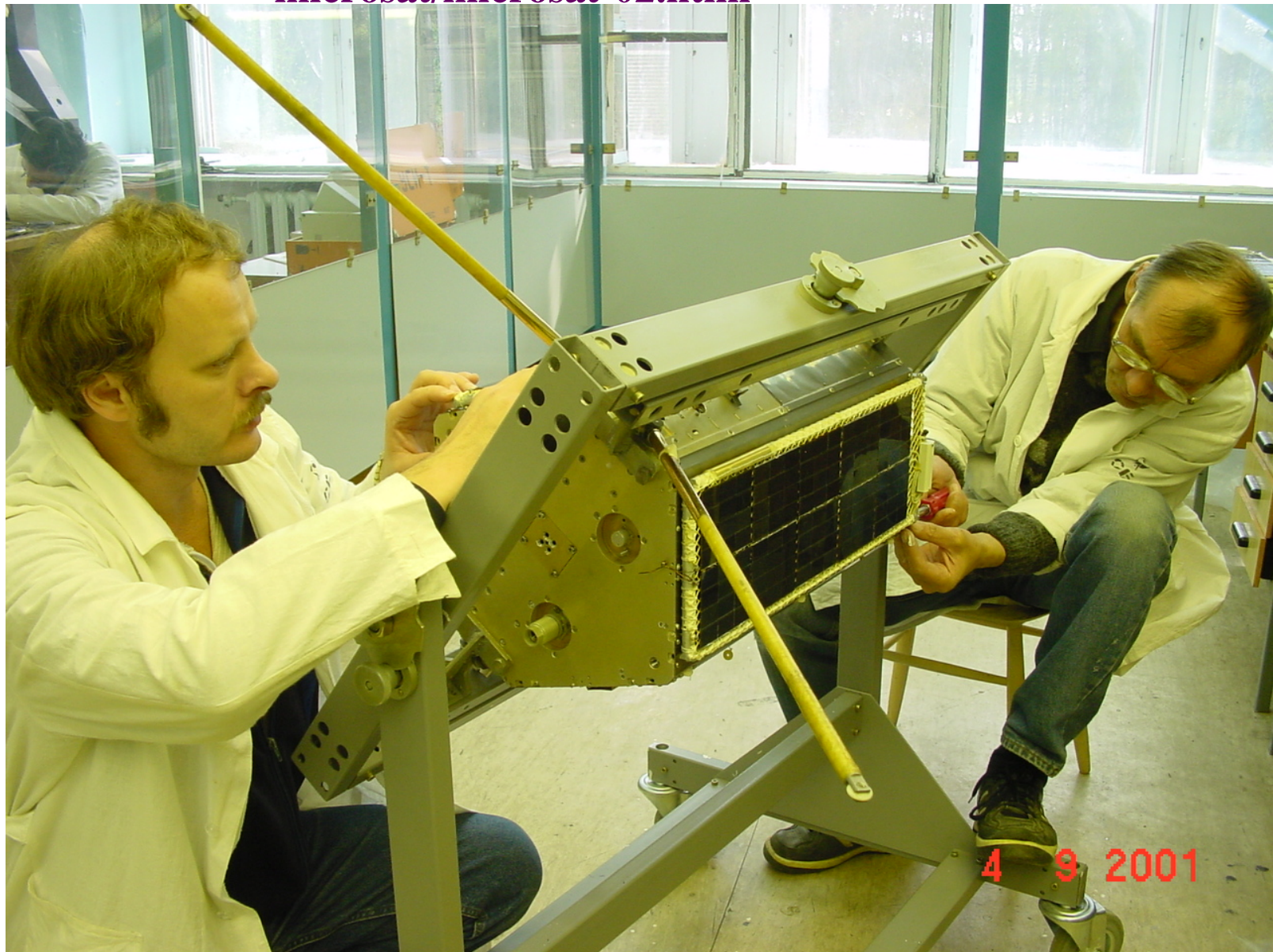
**[http://www.energia.ru/english/energia/sci-education/
microsat/microsat-02.html](http://www.energia.ru/english/energia/sci-education/microsat/microsat-02.html)**



“Kolibri-2000”

**[http://www.energia.ru/english/
energia/sci-education/](http://www.energia.ru/english/energia/sci-education/)**

[microsat/microsat-02.html](http://www.energia.ru/english/energia/sci-education/microsat/microsat-02.html)





The basic characteristics of “Kolibri-2000”:

Weight

20,5 kg, including:

scientific equipment

3.6 kg:

- flux-gate magnetometer 0.8 kg;
- analyzer of particles and electric fields 2.8 kg

magnetic-gravitational stabilization and

one-axis orientation system

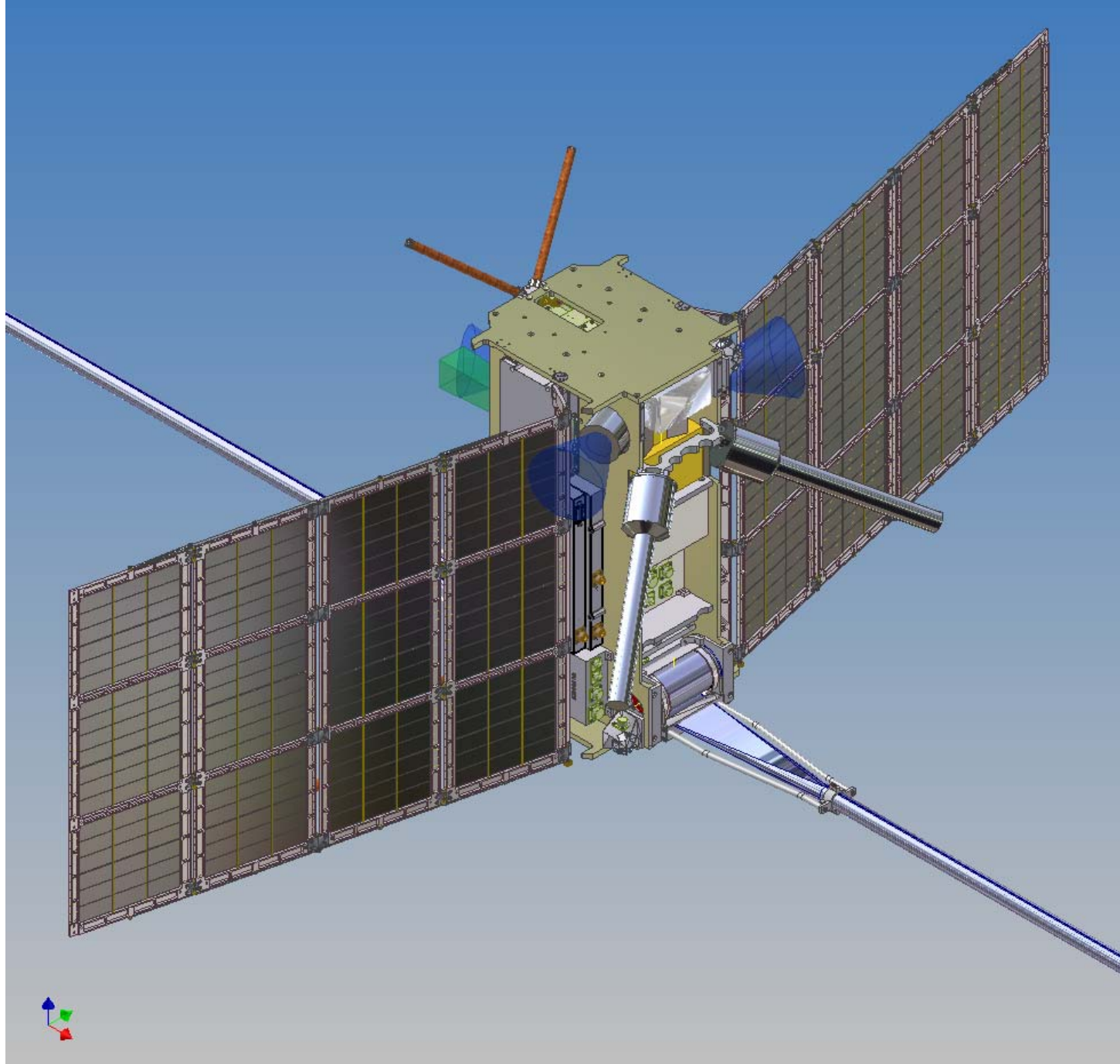
2.7 kg

service system with:

12.5 kg

- transmitter / receiver and the buffer store with capacity of 2 Mbytes
1.9 kg
- power supply system (12 +2/-3 V, 3.5 Ah) 5.1 kg
- cables, connectors 1.9 kg
- construction and thermo-regulation system 5.3 kg

**At present in IKI RAS is conducted
the development of
new microsatellite "Chibis".**



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 transmitted information - ~ 50 Mbayt/day
- The radio frequency** - links 145 and 435 MHz.
- The system of onboard power supply** 50 W:

Universality is basic design principle with the creation of microsatellite. This principle realizes with the aid of the development and repeated use of universal base platform.

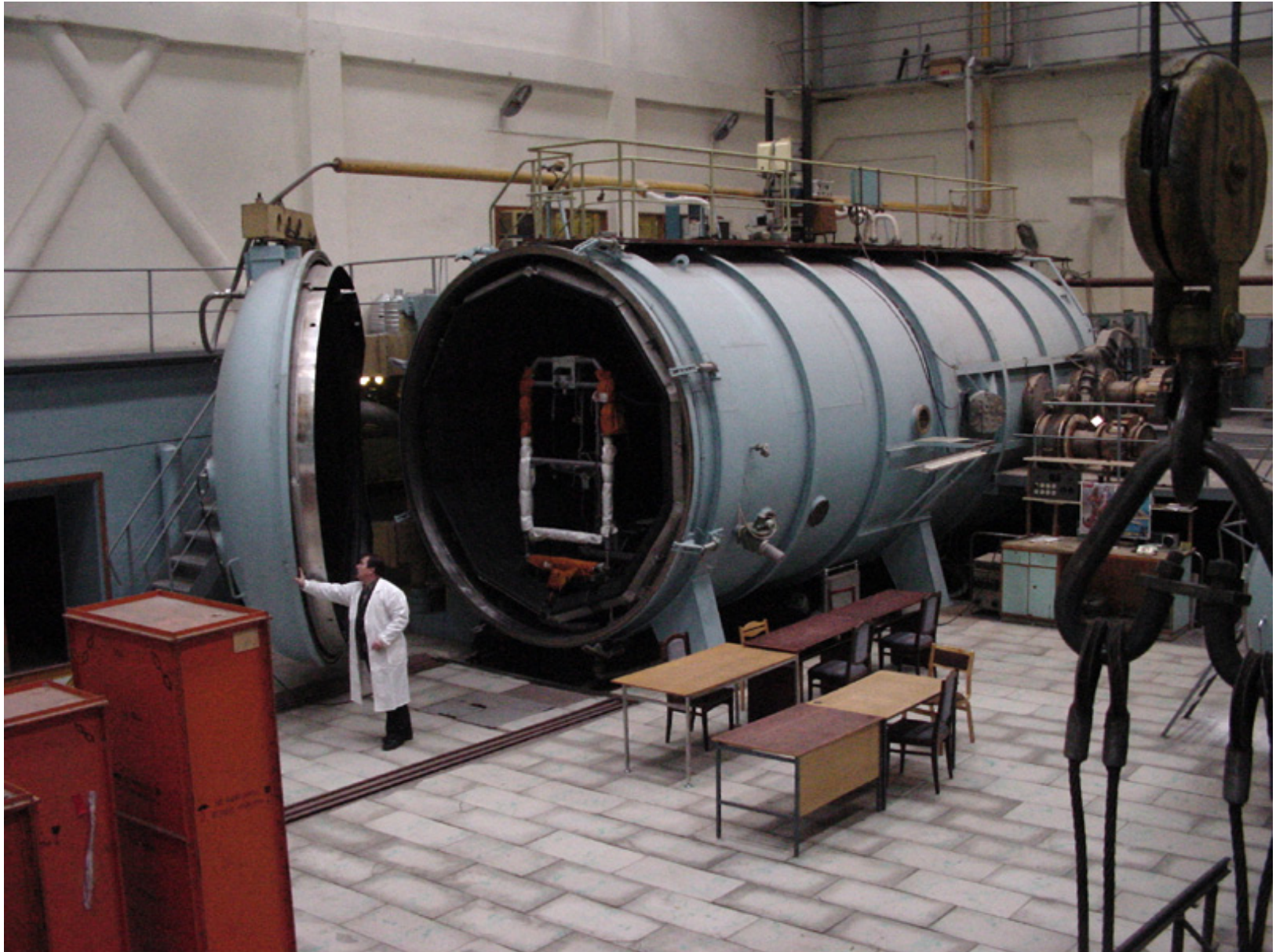
Therefore in an entire series MS it remains to 60-80 % structural elements and systems.

A base series MS manufactured in the IKI RAN with the participation of the leading organizations of Russian space industry.

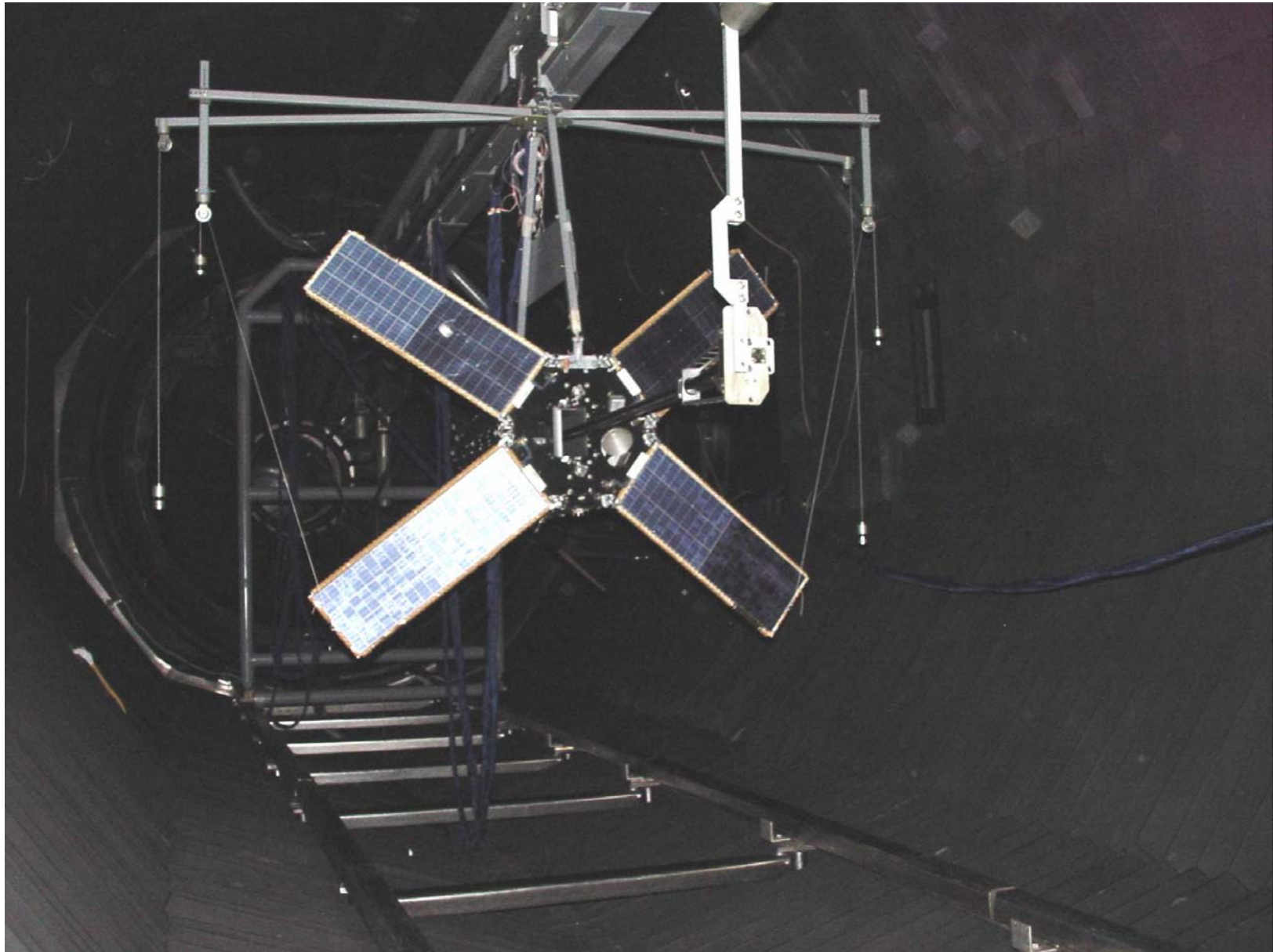
- **Space Research Institute, RAS, (Moscow);**
- **Nuclear Physics Institute of MSU Moscow);**
- **Rocket and Space Corporation “Energia” after S.P.Korolev (Korolev);**
- **TsNII Mashinostroenie (Korolev);**
- **TsUP TsNII Mashinostroenie (Korolev);**
- **Research Laboratory ROSTO, group PLIS (Kaluga)**
- **NPO Mashinostroenie (Reutov)**
- **"Polet" Corporation and Design Buro (Omsk)**
- **Mag-Sensors (St. Peterburg)**
- **AK Rigel (St. Peterburg)**
- **RG NIITsPK after Yu.A.Gagarin (Star City)**



In IKI RAN is
an equipment for
conducting
the complete cycle of
the ground tests of
microsatellite



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





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It is important to note that within the framework of this program it is developed the ground-based infrastructure, which ensures method and processing of telemetry data from MS.

This infrastructure is equipped with the equipment, widely used by world radio amateur's association.



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Simplicity and practically complete automation of ground-based infrastructure, its mobility, and can contribute to the guarantee of steady social and economic development of the developing countries, first of all by means of an increase in the information of the persons, responsible for decision making.

**The space and ground-based segments
united in this program are also
the unique training-enlightenment equipment with
the collection of satellite data and others contributing to
the creation of potential resources,
given to establishments and organizations of
the United Nations.**

The cultural program of seminar provides
for the visit of museum:

- local region of Tarusa city,
- of cosmonautics of Kaluga city,
- museum - estate of V.D.Polenov painter

and

concert of Svyatoslav Richter's Fund.

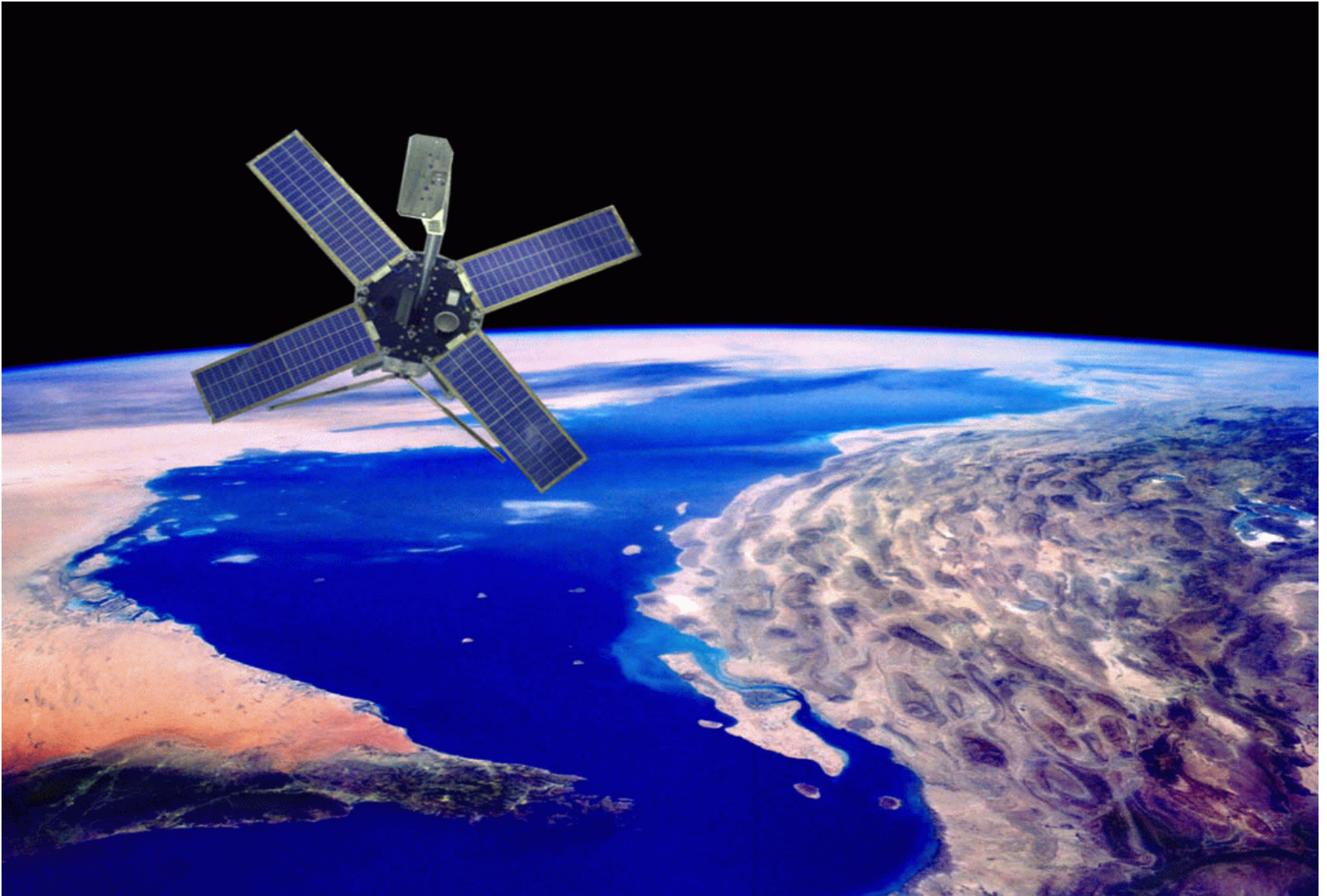








Basis is created thus, relying on regional and international collaboration, the assistance of the use of space sciences, technology and applied developments for the involvement of the developing countries the system of the early warning of natural and technogenic catastrophes.





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