

MARS 500

«MARS 500» PROJECT

Finishing of
520-day isolation

Moscow
November, 2011



During the half-century period of space exploration by humans, enormous scientific work has been done - from single-turn flights around Earth to many-months expeditions on the near-Earth orbit. But the humanity, no doubt, can and must aim at going further in space. Without people it is not possible to investigate in detail and get familiar with planets similar to Earth, for example, Mars.

For realization of the programs of investigation of outer space a preparatory period is necessary, during which it is necessary to solve issues of preliminary investigation of the problems, connected with far manned flights. For example, how long people will be able to interact in a confined environment, how their physical state will change at this, and a series of other aspects. «Mars 500», including a series of experiments, simulating different conditions of an interplanetary space flight, is aimed at solving of this circle of questions.

At this it is necessary to understand that solving of such a global and comprehensive task as flying to space for scientific purposes, in particular, for disclosing of the mystery of life appearing, is possible only in case of uniting of efforts of the leading states in the sphere of space activity.

The Head of the Federal space agency

V. A. Popovkin



Ground-based simulating experiments are important for solving of topical tasks of the space medicine. They have played a big role in substantiation of the possibility of prolongation of duration and increase of reliability of space expeditions.

Simulation experiments allow to conduct assessments of the conception of biomedical support of the crew of the developed manned ship or a concrete mission, to assess significance of separate factors of a space flight in changing of the state of health and working capacity of the crew's members, to obtain necessary data for development of biomedical requirements for manned space ships.

Mars seems to be a unique planet for investigation of the questions of evolution of the planets of the Solar system, forecast of the development of Earth and its biosphere. But the main thing is that Mars is the only planet, promising from the point of view of human settlement there, Perhaps it is the main purpose of the human flight to Mars in the interests of preserving of Earth civilization.

Vice-president of the Russian Academy of sciences,
scientific head of SSC RF– IBMP RAS,
academician

A.I. Grigoriev



Russia has the unique experience of conduction of human long-term space flights, support of continuous efficient work at the near-Earth orbit with the duration of more than a year.

During development of the strategy and planning of a manned expedition to Mars, the human factor becomes the main priority, and humans become the most valuable and vulnerable unit of the mission, to a great extent determining the possibility of realization of the project in general.

In SSC RF – IBMP RAS great experience has been accumulated of conduction of long-term investigations, simulating combined effects on humans of space flight factors.

Unique equipment, including the only one in the world set of pressurized chambers with the controlled habitat, will allow to conduct investigations in conditions, that are maximally close to the real conditions of a manned Martian expedition.

Director of SSC RF – IBMP RAS
Corresponding member of RAS,
Full member of RAMS

I.B. Ushakov

The administration of the «Mars-500» project

Morukov Boris Vladimirovich

Director of «Mars-500» project

Doctor of medical sciences on the specialty «Aviation, space and sea medicine», cosmonaut-researcher, deputy director of SSC RF – IBMP RAS on science, head of the department of physiology of homeostatic regulations of IBMP.

He was the first in the world to conduct a series of investigations with participation of men-volunteers (120-370 days) and women-volunteers (120 days) in conditions of antiorthostatic hypokinesia with the aim of verification of new prophylactic approaches for long-term space flights. The results of the experiments helped cosmonauts to conduct record flights (Polyakov V.V. – 438 days, L. Shannon – 188 days, E. Kondakova – 169 days).

He is the author of 8 inventions and of more than 160 scientific works.



Demin Evgeniy Pavlovich

Deputy director of the project on technical issues

A specialist on the systems of support of the gas composition, protecting space suits for the work in open space, organization and conduction of comprehensive tests of the life support systems.

He has governmental awards, including awards of the Federation of Cosmonautics of Russia. Laureate of the Russian Federation Government prize in the sphere of science and technique.



Belakovskiy Mark Samuilovich

Deputy director of the project, head manager

He has great experience of organization and conduction of big international projects in the sphere of space medicine and biology.

Honored worker of the public health care of the Russian Federation, laureate of the Russian Federation Government prize in the sphere of science and technique, full member of International Academy of Astronautics, full member of the Russian Academy of Cosmonautics named after K. E. Tsiolkovskiy, winner of the Moscow contest «Manager of the year - 2005» in nomination «Scientific investigations and research-and-development works».



Scientific substantiation of «Mars-500» project

One of the most important aims of human space activity is the eagerness to expand the scope of scientific investigations and provide obtaining of new knowledge.

Exploration of its own «home» from the world ocean to space has been one of the elements of civilization's development.

Mars exploration will help to a great extent to forecast development of Earth, go further in the problem of life appearing, and so on. This is exploration of the surrounding world.

The main problem of organization of human flight to Mars is providing safe returning of the crew from the interplanetary flight. At this, approaches to organization of life and activity of the crew of the Martian expedition will be different from orbital flights.

The question about the possibility of successful implementation of a manned flight with going and work of the expedition on the Martian surface, from the point of view of its biomedical support, remains open. It is connected with newness and specificity of the problems, predetermined, first of all, by peculiarity and conditions of conduction of the Martian expedition, the main factors of which are long duration; autonomy, high level of space radiation, alteration of different levels of gravity; long staying of the crew in conditions of social isolation, confined environment and alienation from the Earth conditions of life; absence of habitual magnetic field; high degree of responsibility for the success of the mission in combination with significant risk.

During the development of the strategy and planning of a manned expedition to Mars, the human factor becomes the main priority, and the humans become the most valuable and vulnerable unit of the mission, to a great extent determining possibility of realization of the project in general.

Reliability of implementation of the program of the flight will to a significant extent depend on preservation of health and working capacity of cosmonauts.

The most significant problem factor of the Martian flight - autonomy of the expedition- influences significantly the structure of biomedical support of the expedition, the increase of loading on the crew, increase of the level of responsibility and psychological tension, and, in the end, probability of successful performance of the expedition to Mars.

The aims and objectives of the experiment

The experiment is to give an answer on the main principal question: whether human health and working capacity will be preserved at the necessary level at limits typical for the Martian flight, as they can influence directly and significantly the physical and psychological state of the crew.

The aim of the experiment is studying interaction in the counter «human - environment» and obtaining of experimental data about the state of health and working capacity of humans, staying in conditions of isolation in confined pressurized environment during simulation of the main differences and peculiarities typical for the Martian flight.

The objectives of the experiment are as follows:

- studying of the influence of the conditions of a manned Martian expedition on health and working capacity of the crew;
- verification of organization of activity of the crew and its interaction with the ground-based control center during simulation of peculiarities, typical for the Martian flight;
- verification of the principles, methods and means of control and monitoring of the habitat;
- verification of the principles, methods and means of control, diagnostics and forecasting of the state of health and working capacity, providing of medical help, means of collection, processing and analysis of medical and physiological information, means of prophylaxis;
- approbation of the elements of reference-informative system;
- verification of the means and methods of telemedicine for distant control over the state of human health;
- approbation of methods and autonomous means of psychological support;
- assessment of the modern technologies of the systems and means of life support and human protection.

The project is being conducted under the auspices of Roscosmos and Russian academy of sciences at the premises of SSC RF - IBMP RAS with wide participation of Russian and international organizations.

The main part of «Mars-500» project is a series of experiments on long-term isolation of the crew in conditions of specially created ground-based medical-technical facility.

- 14-day isolation (finished in November 2007)
- 105-day isolation (finished in July 2009)
- 520-day isolation (June 2010-November 2011).

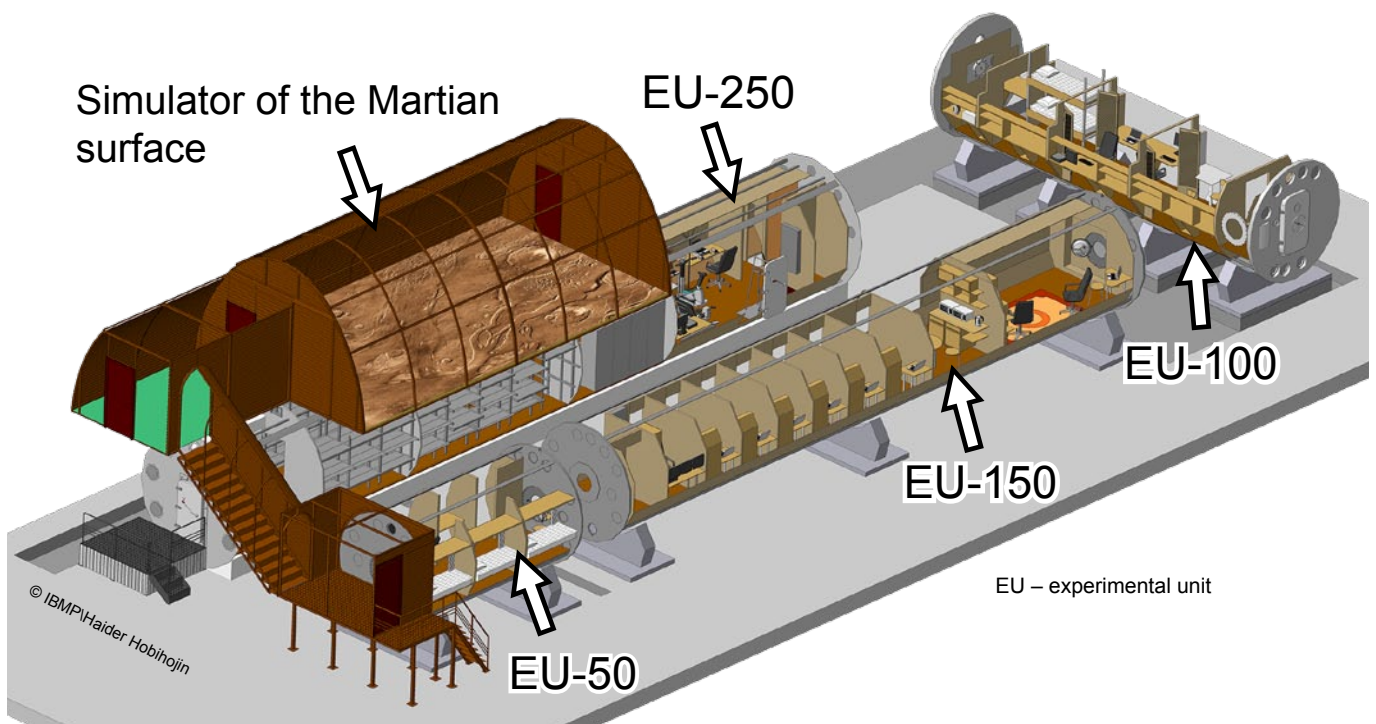
The general view of the medical-technical experimental facility



The medical-technical facility of SSC RF - IBMP RAS is aimed at simulation of life conditions and activity of the crew, that are maximally close to the conditions of real space ships, support of conduction of the experiment, simulating a space flight, including interplanetary one, with the duration of not fewer than 500 days with the crew consisting of 4-6

people.

During the experiment the parameters of the gas environment in the modules complied with the figures given in Governmental standard R 50804-95 «Habitat of a cosmonaut in a manned space ship».



The crew of 520-day isolation

Sitev Alexey Sergeevich – the commander of the crew



Age: 39 years old.

Residence: Russia, Moscow region, Star city.

: engineer-shipbuilder.

Education: In 1996 graduated from Higher Military-marine engineering of Lenin's order college named after F. E. Dzehzhinskiy on the specialty search-rescue and diving works, building of rescue and ship-lifting means and ships (Saint-Petersburg).

Experience: From 1996 served as the teacher-commander of the platoon on Black sea Navy (Sevastopol city). During the period of service he became familiar with all the types of diving equipment. He performed educational deep diving from the board of the rescue ship «Epron», trained more than 250 junior specialists of the Navy on qualification «deepwater diver». In 2004 he was transferred to Y. A. Gagarin's CTC on a position of the leading engineer-investigator (senior diving specialist). He participated in preparation of ISS crews on extravehicular activity in conditions of simulated weightlessness in hydro environment. He was the head of diving training of the candidates for cosmonauts and members of the investigating team.

Kamolov Sukhrob Rustamovich – physician crew



Age: 39 years old.

Residence: Russia, Moscow.

Profession: surgeon.

Education: In 1996 graduated from Russian Military-medical academy named after S. M. Kirov (Saint-Petersburg), faculty - preparation of physicians of foreign armies. In 1997 finished internship training on the specialty surgery. Candidate of medical sciences, in 2009 defended dissertation on the theme: «Immediate and postponed results of prosthesis of aortal valve with carcass xenopericardial prosthesis of «BioLab» series».

Experience: From 1990 to 1994 – studying at the medical faculty of Tadzhikistan medical university. In 1994 he was transferred into Military-medical academy named after S. M. Kirov. Since 1998 he conducted operations in the military hospital of Dushanbe city. He worked in border regions of Tadzhikistan with Afganistan, has experience of working with firearm and knife wounds. Since 2001 he worked in the department of oral surgery. From 2004 to 2006 he finished residency training on cardio-vascular surgery in SSCVS named after Bakulev (Moscow). In 2006 he entered post-graduate courses, finished them successfully and defended dissertation in 2009. He worked in SSCVS named after Bakulev in the department of ESAHD and participated in operations on the heart as the first assistant.

Smoleevskiy Alexandr Egorovich – investigator



Age: 34 years old.

Residence: Russia, Moscow.

Profession: Military physician, physician of general practice, physiologist.

Education: In 2005 he finished with honor Military-medical academy named after S. K. Kirov, faculty of physicians training for Air and space forces. In 2006 he finished internship training on specialty «physician of general practice».

Experience: Since 2006 he was a scientific employee of the scientific-research investigation department, scientific-research investigation center of aviation, space medicine and military ergonomics (SRIC ASM and ME). A specialist on medical support of testing of aviation sets and examples of military technique, medical devices, apparatus and facilities. He studies issues of the increase of tolerance of human organism to unfavorable factors of the habitat and conditions of activity. Since 2009 ha was the head of the laboratory of psycho-physiological investigations. He studied the problem of information interaction human – technical means.

Charles Romain – on-board engineer (ESA)



Age: 32 years old.

Country: France.

Residence: Saint Malo, France.

Profession: engineer.

Education: Romain Charles got a magister degree in engineering in the French institute of modern mechanics in Klermont Ferand, France, education lasted from 1999 to 2004.

Experience: He worked for Sotira company (that is a part of SORA group of companies) since 2005. At the present time he works as a manager on quality in a company that produces combined blocks, he is also an engineer on quality in such companies as McLaren, Aston

Martin and Tesla Motors.

After finishing of the university in 2004 he worked as an engineer on quality of automobile spare parts in Mann + Hummel company. He also worked at the projects for Nissan company.

Urbina Diego – investigator (ESA)



Age: 28 years old.

Country: Italy.

Profession: engineer.

Education: He got the degree of bachelor and magister in the sphere of electronic engineering in polytechnic of Torino, in Turin, Italy, and also the degree of magister on space investigations in International space university in Strasburg, France.

Experience: Diego Urbina was a member of the crew on the investigation station of the Martian desert in Utah, the USA in January 2010, he studied the growth of tropical plants and limitations of space suits. He was an investigator of the systems of control over the orbit and position in space in the project Aramis nono-satellite in Polytechnic of Torino in 2008.

After finishing of university Urbina was involved in organization of outreach and educational activity in developing countries. Before this he underwent training as a trainer for astronauts and on operations on the neutral floating station of the European astronautic center of ESA in Cologne, Germany, from May to August 2009.

Urbina participated in the experiment «transformation of imaging» on ISS, he provided many-time measurements for basic data collection, as well in testing of the experiment during the 50th campaign on parabolic flights in 2009.

Wang Yue – investigator



Age: 29 years old.

Nationality: chinese.

Residence: China, Beijing.

Profession: Teacher's assistant for cosmonaut, dealing with trainings on adaptation for the environment and selection.

Education: 2000–2005 Nantsin, medical college. Prophylaxis medicine.

2005–2008 Chinese cosmonauts' training center. Physiology.

Experience: From 2008 till the present time – Chinese cosmonauts' training center. He participates in preparation and selection of cosmonauts. He is in the second team of preliminary selection of the cosmonauts of China.

The structure of the scientific investigations, conducted during 520-day isolation

The careful work of a special commission, consisting of IBMP's scientists allowed to choose from many submitted applications 106 scientific investigations, that most fit the objectives of the project. The following experiments were selected: 28 psychological and psychophysiological, 34 clinical and laboratory- diagnostic, 26 physiological, 8 sanitary-hygienic and microbiological and 10 operational-technological experiments. Investigators from different space agencies and countries of the world united for solving of the given objective. In «Mars-500» project groups of scientists of European space agency, specialists from Germany, Italy, Spain, Canada, China, Malaysia, South Korea, the USA, Czech Republic, etc. participated. Leading Russian scientific centers and universities are also widely represented in the project, including RSC «Energia» named after S. P. Korolev, Y. A. Gagarin's CTC, IKI RAS, Institute of biochemical physics named after N. M. Emanuel of RAS, Institute of chemical physics named after N. N. Semenov RAS, VKNTS RAMN, M. I. Lomonosov's MSU, Moscow medical academy named after I. M. Sechenov, MATI, MSU of instrument engineering and informatics, MSPU named after Lenin, FGGU «Institute of increase of qualification» of FVS of Russia, Pacific ocean oceanic institute, Tambov state university and other scientific organizations.

Scientific program

Implementation of the scientific program.

Daily activity of the crew was performed on the basis of long-term time-line, developed by a group of planning and taking into account the dates of conduction, labor intensity and difficulty of methodologies, business of the crew members, possibility of mutual influence of the experiments and necessity of observing of special conditions during conduction of the experiments. The experience of 14- and 105-day isolation allowed to single out drawbacks, conduct analysis of mistakes, improve on-board instructions and remove mistakes.

Once a week the crew was given daily time-line, in which methodologies were given, conducted by each crew member at definite time, and if necessary - with mentioning the person conducting the investigation or helping during conduction of the experiment by the crew member. One-two days before the beginning of the experimental session the principal investigator of the experiment sent a radiogram to the investigators with the instruction on conduction of the experimental session. Before the beginning of the isolation period presentations of the programs were conducted for the investigators, training classes were held, preferences were determined, the responsible crew member for conduction of each scientific program during the period of isolation was appointed. Due to careful preparation of the experiments practically there were not any failures or postponing of the investigations to other dates.



Sukhrob Kamolov is helping Alexandr Smoleevskiy to get ready for «Pilot-1» methodology
Romain Charles is on duty at the main console



Alexey Sitev is helping Wang Yue to get ready for «Thermolab» methodology
Sukhrob Kamolov is conducting capillaroscopy for Alexey Sitev





Alexey Sitev is conducting one of the psychological methodologies



Wang Yue is conducting «Ecosan» experiment



Diego Urbina is collecting microflora samples from the panels, used in the orbital modules of the space station



On the left: Romain and Sukhrob are conducting microbiological control of the habitat

On the right: Romain is conducting daily gastroenterography



Sukhrob Kamolov is putting encephalograph on Alexandr Smoleevskiy



Alexey Sitev is conducting methodology of Chinese traditional medicine

Medical control

Medical control in the process of the experiment included daily medical control, in-depth monthly control and expert half-yearly medical control.

Daily medical control consisted of subjective assessment of the state of health on a special questionnaire, and also morning and evening control of the main indices of vital activity (pressure, heart rate, body temperature, weight).

In-depth (monthly) medical control included in-depth assessment of the activity of the cardio-vascular system (electrocardiographic investigation at rest and with loading, on indications conduction of Holter's monitoring and monitoring of the arterial pressure), laboratory methods of blood and urine analysis, private medical and psychological conferences.

Expert half-yearly medical control included both a series of the procedures,, included into the in-depth medical control, and additional investigations - assessment of the state of ENT-organs, vision organs, the state of skin and teeth-jaw apparatus, and also data of the audiometry analysis and assessment of the state of internal organs, obtained by means of ultra sound examination. The given data were transmitted to the ground-based services of the medical control via telemedicine.

All these three parts of the medical control allowed not only to conduct comprehensive monitoring of the state of health of the crew members, but also detect development of functional and somatic disorders at early stages of their development, assess efficiency and adequacy of prescribed and conducted medical-prophylactic procedures.

On November 24, 2010 and May 23, 2011 a meeting of the medical-expert commission was held (MEC) of SSC RF - IBMP RAS, where the state of health of the volunteers - members of the crew was analyzed, on the 175th and 350th days of the experiment with 520-day isolation. MEC made a conclusion that the state of health of the crew members could not prevent them from further participation in the experiment and implementation by them of the scientific program.



Medical kit



On the treadmill



Blood taking for experimental investigations



ECG recording



Audiometry

Verification of the system of prophylaxis for preserving and maintaining of working capacity of the crew of the Martian expedition

The system of prophylaxis activities in space flights, providing keeping of the working capacity of cosmonauts at a high level and preserving their health, contributed into prolongation of the duration of space flights up to 12 months. The experience of flights on the international space station (ISS) allowed to formulate a series of tasks, solving of which is important for providing of high efficiency of prophylaxis activities in interplanetary space flights.

It is evident that in over-long flights, including an interplanetary flight to Mars, ability of systematic daily and monotonous enough performance by the crew of highly intensive training programs can be limited by the state of health, tense working activity, decrease of the motivation level and other factors. During the flight some periods are possible, when on these or those reasons trainings can be stopped. In this connection a question appears about the influence of long gaps in physical trainings on the working capacity of the crew members and about rehabilitation period after long gaps in physical trainings.

The key place in the system of the Russian prophylaxis is occupied by physical trainings, performed by the members of the space crews daily on the treadmill, cyclo-ergometer and strength training devices. At the same time the problem of efficiency of different means, methods and regimes of prophylaxis till the present time remains arguable. In particular in the Russian system of prophylaxis the key element is locomotor training, and in the American program the main place is given to the strength training.

Hypokinesia plays the most important role in the development of a series of diseases of the cardiovascular system, bone-muscular apparatus, systems of motion control. The muscular system is one of the leading ones, determining and limiting human working capacity in a space flight. Staying in the conditions of microgravity is accompanied with the development of deep changes in different units of the motion apparatus.

Simulation of a Martian flight in ground-based conditions gave an opportunity for working out of a rational system of prophylaxis, aimed at preventing of negative influence of the decrease of the level of motion activity on the movement apparatus and cardio-respiratory system of humans.

The control over the training process on board, correction of the regimes, analysis of the state and level of fitness of the crew members was conducted by the specialists on prophylaxis of adverse effects of microgravity from MCC.

In conditions of an autonomous interplanetary

flight, control over the training process from the ground-based control center cannot be enough. Automated control with the use of computer technologies seems more efficient in these conditions. In the experiment the expert automated system of control over the physical trainings (BASUFT) was used developed by SSC RF - IBMP RAS, allowing to control the training process and if necessary make corrections operatively in the protocol of trainings taking into account possibilities of the existing on board training devices.



Training with expanders



Training of the strength training device



Training on the vibration platform device



Morning exercises



Training on the strength training device

Simulation of going to the Martian surface

The aim of the stage of landing on the Martian surface

In the period from 01.02 to 01.03.2011 simulation of going to the Martian surface and works of the crew on the surface was successfully conducted. The aim of the given stage was simulation of the crew's activity on providing of going and work on the Martian surface with the use of robotic-technical means, and also computer technologies and technologies of virtual reality.

The objectives of the stage included:

- Getting familiar with the equipment of module EU-50 (simulator of the landing module), transfer and distribution of loads from the reserve storing room;
- Simulation of dynamic operations on undocking and docking of the landing module with interplanetary space facility;
- Trainings of the crew members with virtual and computer models of the crew's activity on the Martian surface;
- Simulation of distribution of liquid media of the organism at influence of microgravity before landing of the crew on the Martian surface;
- Conduction of constant trainings of the crew with the use of three-dimensional virtual model of the crew's activity on the Martian surface;
- Support and implementation of 3 goings out on the Martian surface of the members of the team of investigators;
- Distant investigation of the surface of Mars with the use of real robotic-technical means;
- Providing of medical control and the program of scientific investigations during the activity on the Martian surface.

At this stage 4 projects were successfully realized:

1. «Investigation of the effects of cranial re-distribution of liquid media on the state of working capacity and orthostatic tolerance of humans during the work in a space ship on the simulated surface of Mars in a ground-based experiment with long isolation, simulating a manned flight to Mars»;
2. Implementation of 3 goings on the surface of Mars and its studying with the help of robotic-technical means (rover «Gulliver»). Going out was implemented on the 14th, 18th and 22nd of February, 20011.
3. Investigations with the use of virtual reality technology (VIRTU).
4. Approbation of «The means of training and assessment of working capacity PRET (Performance Readiness Evaluation and Training Tool)» in the frameworks of the project «Mars-500».



Live broadcast of the landing on «Mars» in MCC (Korolev city)



Work with the instruments for soil samples collection



Alexandr Smoleevskiy is operating «Gulliver» Mars-rover



The crew of the Mars landing.

Left to right: Diego Urbina, Alexandr Smoleevskiy, Wang Yue

Psychological support

Organization of psychological support in conditions of over-long isolation and autonomy of the crew requires special approach as limitations in connection lead to the necessity of organization of a stationary system of psychological support, that can be expanded due to additional delivery of the required materials (films, news, music etc.) during the flight on communication channels.

The aims of the psychological support:

1. Struggle with sensory deprivation, preservation of psychical health.
2. Directed regulation of the emotional sphere (forming of positive emotional states).
3. Organization of leisure activities.

Tasks solving during the experiment:

1. Information support of non-professional character.
2. Compensation of the deficit of social contacts.
3. Satisfaction of esthetic demands.

The first and the main principle of organization of psychological support of many-national crew is attitude to it as to the single whole, not depending on different nationalities, affiliation to different space agencies or countries.

For realization of this principle a single psychological group was established of the specialists from IBMP and ESA with participation of the Chinese specialists. The duties of the group also included discussing and working out of consolidated decisions on organization of information flows, activities for the whole crew and for its separate members, monitoring of the psychological state of the group during the whole experiment, solving of operative tasks on requests of the crew.

During the experiment analysis was constantly conducted of the remarks and wishes of the crew, expansion of activities and means of psychological support, search for new possibilities and new technologies, selection of materials for expansion of sound recordings library, books library, films, and also private psychological conferences on correspondence, aimed at detection of problem situations in the crew. Besides, a separate confidential communication channel was created for personal correspondence, correspondence with psychologists and realization of the activities on psychological support.

Besides, verification of the criteria of early diagnostics and forecast of adverse psychological situations allowed to apply means of psychological prophylaxis at very early stages and not to allow developing of a conflict situation in the group, disorganization of the activity of the whole crew and its members

Off-nominal situations

During the experiment two off-nominal situations were simulated. On December 1-2, 2010 the first off-nominal situation was simulated, simulating short circuit and further fire outbreak on the central control panel, supplying electrical energy for the whole medical-technical facility. Verification of this off-nominal situation was successful and showed good moral preparation of the crew and its ability to act actively in a stressful situation.

The second off-nominal situation was conducted in the period from April 18 to 25, 2011. In it temporary failure of connection between the crew and the ground-based control center was simulated due to electromagnetic storms (that is communication exchange with information was completely stopped). It is necessary to emphasize that the given off-nominal situation was conducted on one of the most difficult parts of the way – way to home. It was difficult because monotony was gradually growing, when the crew got used to the program of the experiment, the investigations lost their newness and difficulty, and the most interesting stage of the experiment - work on «Mars» had already finished.

Verification of the given situation showed that relatively short absence of communication between the crew and the on-ground control center, at the condition of staying of the crew in conditions of «high autonomy» did not influence significantly implementation of the «flight» program.



Interest of the community

«Mars-500» project turned out to be interesting not only for the scientific community, but also for very different categories of people - schoolchildren, students, artists, writers, cosmonauts and politicians. The journalists, of course, did not forget about the project either - a lot of scientific-popular articles in different languages have been written about it.

During the conduction of 520-day isolation the experimental facility was visited by the head of the Federal space agency, Russian academy of sciences, representatives of the RF president's administration, head of the administrative office of the manned cosmonautics of China Van Venbao, the first Chinese cosmonaut Yan Livey, the head of the political administration of the Main administration of the weapons and military technique of the People's liberation army of China) general-colonel Chi Vanchun, director general of the space agency of France Yannick d'Escatha, director general of the European space agency Jan-Jack Dorden, the head of the department of manned flights of the European space agency astronaut Thoma Rhyter, the head of the department of investigation operations on ISS Martin Zell.

The crew got a lot of congratulations with New Year and Cosmonautics day. With crossing of the 438-day threshold the crew was congratulated by the hero of the Soviet union, hero of Russia, pilot-cosmonaut Valeriy Polyakov, who conducted the record on duration flight on board orbital station «Mir».



School excursion



The visit of the head of the political administration of HAWMT of China general-colonel Chi Vanchun



The visit of the ESA director Jan-Jack Dorden and the head of the department of investigation operations on ISS Martin Zell



The visit of the director general of the space agency France (CNES) Yannick d'Escatha



The visit of the head of the department of the manned flights of ESA astronaut Thomas Rhyter



The visit of the head of the administration office of the manned cosmonautics of China Wang Wenbao and the first Chinese cosmonaut Yang Liwei

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