ORGANISATION OF SCIENTIFIC RESEARCH IN INTERNATIONAL SPACE PROJECTS

D.V. Rakov, V.N. Sychev

United Nations / United Arab Emirates High level Forum: Space as a Driver for Socioeconomic Sustainable Development
Dubai, United Arab Emirates, 6-9 November 2017
Space medicine and biology

Goals:

1. Investigation of the biological effect of the conditions of aboard the spacecraft (acceleration, weightlessness, isolation, hyperkinesia, artificial habitat).

2. Study of the biological effect of space factors (ionizing radiation, altered magnetic field, UV radiation, vacuum, meteor hazard).

3. Investigation of the possibility of existence of life on other celestial bodies, astrobiological and exobiological research.

4. Studies of human adaptation problems in extreme conditions
Date of lunch – 19.04.2013
Orbit parameters: with the height up 575 km
Inclination – 64,9°
Duration of flights – 30 days
Total weigh of spacecraft – 6480 kg
  Hardware weight - 650 kg inside
  - 250 kg outside
Weight of recovery module – 2300 kg
Temperature at outside space in orbital flight from -150 up to 125 °C
Daily energy supply for hardware 550 w
Rocket – Souz 2
Launching side – Byikonur
Touchdown area – near Orenburg city, RF
Date of landing – 19.05.2013
BION-M2 PROJECT

Major Goal:
Comprehensive investigation of combined effects of increased radiation doses and microgravity on the whole body and its individual systems at the cellular and molecular levels.

Funding starts in 2015
Launch (tentative) in 2022
Flight duration - 30 days
Orbit altitude - 1000 km

Space hardware will be similar to that used on Bion-M1 but modified in view of its Bion-M1 performance
Experimental specimens – C57Bl mice, snails, plants, insects, cell cultures, microorganisms
Scientific equipment on Bion – M project
Set of Russian and foreign institutions – participants of the program of fundamental and applied experiments and researches (52)

1. Russian Federation (32), including: institutes of RAS (20), universities and academies (12).

2. Ukraine (1)

3. Germany (4)

4. USA (12)

5. France (3)

6. Republic of Korea (1)

7. Japan (1)
MARS-500 PROJECT

**Duration of experiment:** 520 days

**Dates of experiment:** June 3, 2010 – November 4, 2011

**Goals:**
- study the human adaptation to simulated peculiarities of future manned mission to Mars.
- study the biomedical requirements for support of extra prolonged orbital manned and interplanetary missions

**Crew:** 6 males in age 25-38 years old from different countries

**Provided conditions:**
- isolation in fully hermetical medico-engineering complex consisting of 5 segments with total volume 550 m³
- autonomous function of complex and crew

**Scientific program included:**
106 – EXPERIMENTS
28 - PSYCHOLOGICAL AND PSYCHOPHYSIOLOGICAL INVESTIGATIONS
34 - CLINICAL AND DIAGNOSTIC LABORATORY INVESTIGATIONS
26 - PHYSIOLOGICAL INVESTIGATION
8 - SANITATION, HYGIENE AND MICROBIOLOGICAL INVESTIGATIONS
10 - TECHNOLOGICAL AND OPERATIONAL INVESTIGATIONS
MARS-500 INTERNATIONAL COOPERATION

15 ESA
5 DLR
3 China
2 Italy
2 South Korea
2 Malaysia
2 Czech Republic
1 Belorussia
1 Canada
1 Spain
1 USA
“Comprehensive assessment of the women's crew psycho-physiological state during the short isolation inside a hermetically closed object, in the frame of Lunar mission simulation”
<table>
<thead>
<tr>
<th>Moon</th>
<th>Through ISS to other planets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9 days</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mark V. Serov – crew commander (RSC “Energia”, 23.05.1974)
Anna Y. Kikina – flight engineer (FSO "Gagarin Research&Test Cosmonaut Training Center", 27.08.1984)
Viktor Fetter – flight engineer (Airbus DS, 23.11.1983)
Ilya V. Rukavishnikov – flight doctor (SSC RF – IBMP RAS, 23.01.1984)
Elena S. Luchitskaya – researcher (SSC RF – IBMP RAS, 01.11.1980)
Natalya Y. Lysova – researcher (SSC RF – IBMP RAS, 17.02.1990)
Gazenko, Oleg G.  
(12.12.1918 – 17.11.2007)

Russian Soviet physiologist, academician, one of the founders of space medicine

SRC of RF-IBMP of RAS organize international conference "Space biology and aviation medicine" Moscow, 10-12/12/18. Conference dedicate to 100 anniversary of O. Gazenko.
GENERAL CONTACT INFORMATION

THE RUSSIAN FEDERATION STATE RESEARCH CENTER – INSTITUTE OF BIOMEDICAL PROBLEMS OF THE RUSSIAN ACADEMY OF SCIENCES

http://www.imbp.ru/

Russia, 123007 Moscow
Khoroshovskoe shosse, 76а

Fax: +7 (499) 195-2253
Tel/Fax: +7 (499) 195-1500
E-mail: info@imbp.ru