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Spacecraft Mars Odyssey

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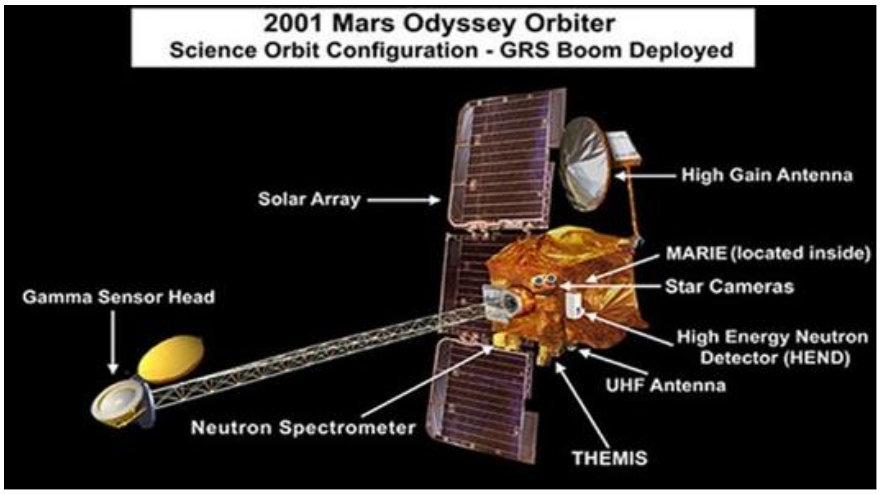
Studying Mars is one of the priority areas in the study of the planets of the solar system. The first attempts to launch spacecraft to Mars were taken by S.P. Korolev in 1960 - unfortunately failed. It took more than 10 years of hard work and 11 starts to finally, December 2, 1971 the Soviet spacecraft "Mars-3" reached the goal and made the first soft landing on the Red planet in the vicinity of the crater Ptolemy. February 12, 1974 the Soviet interplanetary spacecraft "Mars 5" was released on the Mars orbit and shoot the surface. The Earth got relief maps, which well distinguished dry streambed. That allowed the scientists to suggest that Mars, which currently has a cold and dry surface, in the past was warm and humid [1].

The project was developed by NASA. Its mission is to use spectrometers and imagers to detect evidence of past or present water and ice, as well as to study the geology and the radiation situation on the planet. NASA hoped that Odyssey will help to answer the question of whether there was ever life on Mars and create an assessment of radiation risk for future astronauts on Mars. It also acts as a repeater for communication between the rover Mars Science Laboratory, and the Phoenix lander on Earth. The mission was named in honor of Arthur C. Clarke, causing the name of 2001: A Space Odyssey.

The device launched on April 7, the first day of the 21-day launch window. Mars Odyssey was launched into interplanetary trajectory Delta II launch vehicle from the site A, Launch Complex 17. The unit arrived to Mars 20 October 2001 and entered the initial elliptical orbit. It eventually will go to working solar-synchronous polar orbit at an altitude of 400 km [2].



Picture 1 - Device Mars Odyssey

The launch weight of the spacecraft Mars Odyssey - 725.0 kg, dry weight - 331.8 kg, 44.5 kg of which falls on the scientific equipment. In the starting position the device has dimensions

2,2x2,6x1,7 m, the length of the deployed solar array - 5.8 m. It consists of two main sections - the propulsion system and the instrument module as part of the service platform and hardware platform of scientific equipment. A distinctive feature of Mars Odessey-2001 is a 6-meter deployable boom on which the sensors of gamma spectrometer GRS are placed. The structure consists of the main propulsion engine thrust 640 Newton (65.3 kg, hydrazine and nitrogen tetroxide), engines and orientation thrusters. The structure of power subsystem includes Triplex solar battery 7 m² with photovoltaic cells on gallium arsenide, power distribution unit, the battery capacity of 16 A•h. Management and data processing subsystem incorporates a radiation-resistant duplicated control processor RAD6000 with 128 megabytes of RAM and permanent storage capacity 3 MB. Storage is separated from the video unduplicated memory card 1 GB. In the communications subsystem there are included means of communication with the Earth in the range of X and equipment of signal reception with landers in the range of UHF. The device has an antenna small, medium and high gain (LGA, MGA and HGA, respectively) [3].

Scientific equipment (Picture 1):

• Gamma-ray spectrometer GRS. This set of three tools - the actual gamma-ray spectrometer GRS, high-energy neutron detector HEND and neutron spectrometer NS;

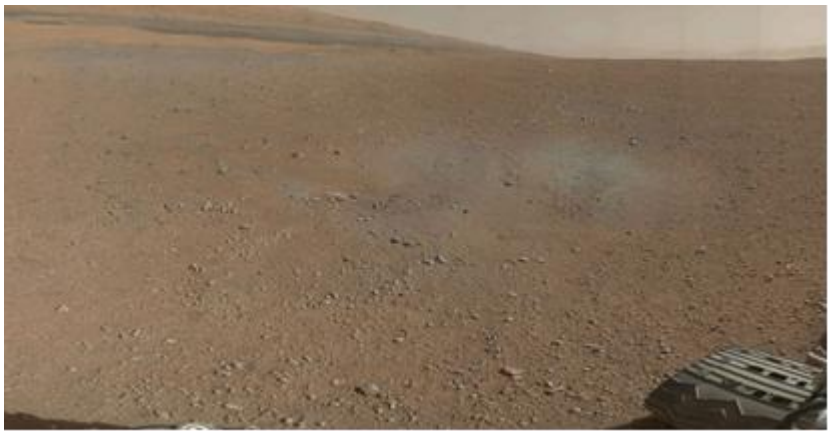
• high-energy neutron detector (Hand), developed by Russian scientists headed by Igor Mitrofanov of the Space Research Institute of Russian Academy of Sciences. Just this device the spring of 2002 found in the upper surface of the Red Planet the existence of a sufficiently large volumes of water.

• Mars radiation environment experiment (Marie). MARIE equipment is designed to study the radiation environment on the route and flight in orbit of a satellite of Mars, followed by analysis of possible radiation doses and its effects on humans.

May 28, 2002, NASA reported that Odyssey GRS has detected large amounts of hydrogen, an indication that there must be ice, lying within a radius of a meter from the planet surface.

Over more than a decade, "Mars Odyssey" continues to explore the Red Planet. NASA spacecraft broke the record in 2010. This is the longest of all missions to Mars. Many discoveries "Mars Odyssey" made independently.

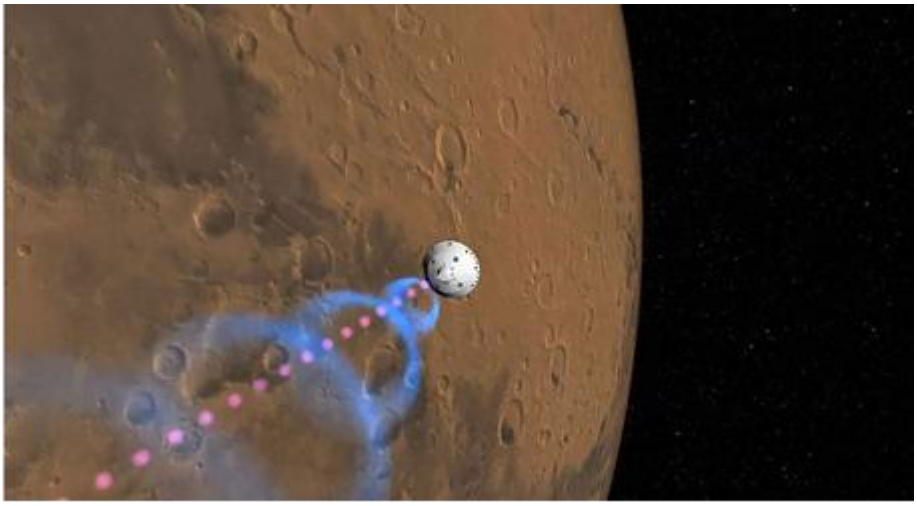
Experts believe obtaining new data by unit Mars Odyssey will accurately determine whether there is an asymmetry placement of chlorides on the surface of Mars. It is possible that the mineral reserves of these substances can be found out and in its northern part, which means that they appeared much later than scientists thought, after the onset of asymmetry on Mars. But this is not the main objective of the mission - a new orbit should help in finding previously unfound minerals on the planet that could be lost from the sight because of insufficient sensitivity of THEMIS. But while scientists are not ready to say what specific substances they are going to find [4].



Picture 2 - The first images made by «2001 Mars Odyssey»

The unit performed a complete map of minerals; studied seasonal changes in the planet, melting of ice at the poles and dust storms; made many other discoveries. For example, it found in the southern polar region of Mars vast deposits of subsurface ice. "If the ice melted, there would be enough water for two Lakes Michigan" - explains the scientists. Extended mission is to bring not less benefits. And it is important, the lion's share of information from two US rovers on Earth goes through a repeater Mars Odyssey [5].

Finally, the spacecraft could make a significant contribution to our understanding of what is required for a more complex exploration of Mars, and perhaps for the planet to be visited by people.



Picture 3 - Data transmission to the earth

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