SPACE EXPLORATION SYMPOSIUM (A3)
Solar System Exploration (5)

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FEASIBLE PROFILES OF SCIENTIFIC AND TECHNICAL EXPERIMENTS IN FRAME OF "VENERA-D" MISSION. INTERNATIONAL COOPERATION ASPECTS

Abstract

In frame of already implemented Venus exploration missions the automated spacecraft have included the following: flyby spacecraft and orbiters, descent vehicles and landers, balloon probes. In Russia there were in total 18 spacecraft developed and launched towards Venus, 10 of them have successfully landed on the planet. The maximal time of SC staying on the surface was 110 minutes, and two balloon stations drifted in atmosphere about two days.

Extreme environment, notably high temperature and atmospheric pressure, and insufficient technical capabilities did not allow long-term studies. A lot of scientific issues are still open.

Interest in Venus exploration has increased recently. Since 2005 the European "Venus-Express" SC has been operating in Venus orbit. In 2010 "Akatsuki" SC of Japanese Space Agency has been launched. They are both orbiters.

Space Agencies of Russia, USA, Europe, Japan, and China are elaborating their Venus exploration missions with application of various technologies and the scientific equipment. The Russian Federal Space Program includes "Venera-D" mission aimed at long-term planetary researches. Various profiles of scientific and technical experiments by means of one or two orbiters, landers, atmospheric probes are currently under consideration. The landing and probe deployment profile is similar to the one, that has been used in well-known "Vega" mission. New engineering approaches, in particular, use of the new aerodynamic devices and wind environments may significantly increase the duration of SC atmospheric operation, or even by a factor of ten.

Complexity of the mission organization subject to application of various technological equipment, high requirements for transfer, receipt and processing of large volumes of scientific and housekeeping data, economic feasibility, result in necessity of effective international cooperation. The available experience of such cooperation in frame of executed and currently running missions will enable defining of long-term Venus research program with participation of many countries.