SPACE EXPLORATION SYMPOSIUM (A3)
Solar System Exploration (6)

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RUSSIAN PROGRAM OF VENUS EXPLORATION BY MEANS OF AUTOMATED SPACECRAFT: HERITAGE AND PERSPECTIVES. VENERA-D PROJECT

Abstract

The Federal Space Program makes provision for continuation of Venus exploration by spacecraft launch in 2016.

Automated spacecraft of "Venus" family, designed in Russia, have reached many objectives for the first time: the first successful spacecraft landing on another planet, first black-and-white and then colored panoramic images of the planet surface, soil analysis, surface radar images, first balloon probes in the atmosphere of another planet, operated about two days and transmitted the scientific data directly to the Earth.

The "Venera-D" project provides long-term planetary research by means of orbiter, atmospheric probes and lander.

It is proposed to use the heritage of venusian spacecraft design and Lavochkin Association recent developments in the field of design of unified orbital-cruise modules and sustainer propulsion system for SC injection into required orbits.

Reentry outline, similar in whole to the one brilliantly implemented in "Vega" project, becomes more complex by the necessity of two balloon probes deployment. Balloon probes shall be launched at different altitudes, in the clouds and under the clouds and should exist in Venus atmosphere for a long time.

Mission scientific objectives include the following:

- study of atmosphere structure and chemical composition, including inert gases and isotopic composition, structure, study of clouds structure, composition and chemistry;

- study of atmosphere dynamics, nature of superrortaion and radiation balance, giant greenhouse effect reasons;

- study of surface structure, mineralogy and geochemistry, seismic and volcanic activity, interaction between atmosphere and surface;

- study of upper atmosphere, ionosphere, magnetosphere, electrical activity, dissipation of atmospheric components.

Successful project implementation will allow fulfilling quite a number of scientific objectives of comparative planetology and approximate to understanding why so similar planets as the Venus and the Earth

evolved so different.