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“TO VENUS TOGETHER”: RUSSIAN-AMERICAN JOINT ENCORE OF VENUS RESEARCHES
WITH ORBITER, LANDER AND ATMOSPHERIC PROBES IN THE PROJECT “VENUS-D”

Abstract

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Mission “Venera-D” by Lavochkin Association implies a long-term study of Venus. International payload is to be installed on orbiter, lander and long-living station on Venus surface. The project is a basis for further large-scale international missions to Venus, previously carried out in 1960-80s and early 1990s by Soviet and American spacecraft. A large amount of data on structure, soil composition, atmosphere, cloud layers, wind speed on the surface were accumulated. Soviet Venus research program was completed in 1986 by landing of “VEGA” (Venus-Halley’s comet), one of the most successful projects in Lavochkin history. Since 1994 (mapping with the NASA Magellan mission) Venus was studied by two spacecraft: “Venus Express” (ESA, 2005-2014) and “Akatsuki” (JAXA, launch - 2010, start of operation - 2015). The first steps of “Venera-D” appeared in the early 2000s with the idea to provide operations on the planet’s surface for several hours and possibly days. With the latest developments, unification of design solutions and new technical tools used in-house Lavochkin experts consider the mission “VEGA” as a prototype for the next automatic interplanetary station destined to Venus. A great interest in participation in “Venera-D” is being shown by the scientists and technicians of space faring states: USA, EU and China. An activity of Russian-U.S. “Venera-D” Joint Scientific Definition Group consisting of Roscosmos/Space Research Institute (IKI RAN)/Lavochkin Association – NASA/U.S. universities is focusing on analysis of mission architecture as well as review of joint cooperation. Russian lander and orbiter assumed to be the main elements. As NASA possible contribution, the Venus atmospheric maneuverable platform, VAMP is considered. Several small drop-probes made on the basis of high-temperature electronics could operate on Venus surface for several hours on different spots of the planet’s surface where they would study local atmosphere. The most prolonged operation on the surface was up to 2 hours (“VEGA” project). The possibility of freely drifting balloons or small sub-satellites is also foreseen. The next step of the study, as suggested by scientists of both countries, should be an investigation of atmospheric dynamics, problems of super-rotation, giant greenhouse effect and planet’s evolution. The RF and the USA have long and vast experience in Venus studies. It gives confidence in successful implementation of the joint program.