VENERA-D: NEW RUSSIAN ATTEMPT TO LAND ON THE SURFACE OF VENUS. M. V. Gerasimov, L. V. Zasova, N. I. Ignatiev, and the Venera-D team, Space Research Institute of the Russian Academy of Science, Profsoyuznaya, 84/32, Moscow, 117997, Russian Federation, mgerasim@mx.iki.rssi.ru.

Venus became a target for exploration early with the start of space flight technologies because of its proximity to the Earth and high scientific interest to the unknown world. More than half century of investigation gave the basic information about the atmosphere and surface of Venus, its interaction with the Solar wind. Being about the same size, density, and composed of similar material, Venusians atmosphere is drastically different from that of the Earth, and internal processes looks to work different. Atmospheric and internal driving mechanisms on Venus are still out of understanding. We need to get new information which can help us to build credible models of Venus's atmosphere and interior. During the preparation of new missions it is important to define the list of targets to be measured, which have high scientific priority and are feasible on the level of technology and mission costs. Exploration of Venus was among the most successful episodes of the Soviet space research program. It started with the launch of Venera-1 spacecraft on February 12, 1961 aiming just to reach the planet and deliver a bannerette. Great challenge of the program was the development of landing capsules which could provide direct measurements of chemical and physical parameters of the atmosphere down to the surface as well as measurement of composition of surface rocks. In a series of 10 successful landings a Lander was worked out which provided atmospheric measurements during the descent, soft landing on the surface of Venus, work on the surface within about an hour, sampling of surface rocks, taking photos at the landing place. Developed methods of analyses are a valid heritage for use in the future missions.

Venera-D is the new mission to Venus which will be included into Russian Federal Space Program 2016-2025. The architecture of the mission includes an Orbiter and a Lander as base mission elements. Subsatellite and Long living (24 hours) station on the surface are also considered as possible mission elements.

Scientific goals of the Venera-D mission are defined as the following:

- Investigation of the structure and chemical composition of the atmosphere, including abundances and elements isotopic ratios of permanent and noble gases;
- Investigation of thermal structure of the atmosphere, winds, thermal tides and solar locked structures;
- Investigation of clouds: structure, composition, microphysics, chemistry;
- Chemical analysis of the surface material, study of the elemental composition of surface rocks, including radiogenic isotopes;
- Study of the interaction between surface and atmosphere, search for volcanic and seismic activity; search for lightnings;
- Study of the dynamics and nature of superrotation, radiative balance and nature of the enormous greenhouse effect;
- Investigation of the upper atmosphere, ionosphere, electrical activity, magnetosphere, escape rate.

The main Lander will track the atmosphere parameters (meteorological, chemical, clouds, TV, net flux, electrical activity, etc.) during the descent and is expected to work more than two hours on the surface after landing (TV, composition of rocks, meteorology, seismology, electrical activity). The Lander would be equipped by devices for atmosphere and surface sampling. The list of proposed instruments on the Lander can provide the following measurements:

- TV- imaging (landing, stereo, panoramic, high resolution up to 0.1 mm);
- Active Gamma and Neutron Spectrometry;
- Gas Chromatography-Mass Spectrometry;
- Mossbauer spectrometry;
- Multi channel tunable diode laser spectrometry;
- Nephelometry;
- Electrical activity sounding;
- Temperature, pressure, and wind velocity;
- Radiometry;
- Radio-science;
- Seismometry.

The Long living station is under consideration. It is proposed to use endothermic phase transition effect with good heat insulation to provide appropriate temperature inside the Lander up to 24 hours. A limited number of low consuming instruments can be selected for the payload.