

**Future Venus exploration: mission Venera-D.** L. V. Zasova<sup>1</sup>, N. I. Ignatiev<sup>1</sup>, and M. V. Gerasimov<sup>1</sup>.<sup>1</sup>Space Research Institute, RAS, Profsoyuznaya 84/32, Moscow 117997, Russia. zasova@iki.rssi.ru

\*The Venera-D team

\*\*The Roscosmos/IKI –NASA Venera-D Joint Science Definition Team (JSDT).

Venera-D is a strategic mission to explore Venus and included in the Russian Federal Space Program 2016-2025. Venera-D mission is in the phase A of scientific study now with limited possibility of experimental work.

( [venera-d.cosmos.ru/index.php?id=658&L=2](http://venera-d.cosmos.ru/index.php?id=658&L=2) ).

Venus was actively studied by Soviet and US missions in 60-90-th years of the last century. The investigations carried out both from the orbit and in situ were highly successful. After a 15-year break in space research of Venus, the ESA Venus Express mission, launched in 2005, successfully continues its work on orbit around Venus, obtaining spectacular results. However, many questions concerning the structure and evolutions of the planet Venus, which are the key questions of comparative planetology and very essential for understanding the possible evolution of the terrestrial climate, cannot be solved by observations only from an orbit. The Venera-D mission is based on the experiences of Soviet missions. However, the elements of mission will be updated and its payload will be totally renewed and modernized, which allows to consider the planned mission as the most advanced tool for complex investigation of the nearby planet. Now the Venera-D project conception includes orbiter, lander, subsatellite, long living station on the surface. Venera-D is focused for both in situ and remote investigations of Venus, its surface and atmosphere, as well plasma environment and solar wind interaction. Practically, most of the experiments for Venera-D, will be provided by international teams. Payload on orbiter should solve the following scientific problems:

-Investigation of the atmospheric structure and composition

- Investigation of thermal structure of the atmosphere (20 -140 km), winds, thermal tides and solar locked structures;

- Investigation of clouds: structure, composition, microphysics, chemistry;

- 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.

Preliminary payload on orbiter includes:

Fourier interferometeretric spectrometer-interferometer

= (1) 5-40  $\mu\text{m}$ ,

$v=2000-250 \text{ cm}^{-1}$ ,  $\Delta v = 1 \text{ cm}^{-1}$

• Solar and star occultation UV spectrometer (0.1-0.3  $\mu\text{m}$ ) and IR (2-4 $\mu\text{m}$ )

• MM-sounder  $\lambda = 3-10$  millimeter

• UV-mapping spectrometer  $\lambda = 0.2-0.5 \mu\text{m}$ ,  $\Delta \lambda = 0.0004 \mu\text{m}$

• IR-mapping spectrometer  $\lambda = 0.3-5.2 \mu\text{m}$ ,  $\Delta \lambda = 2.4 \text{ nm}$

• Multispectral monitoring camera

• Radio science (L, S and X ranges)

• Plasma package

• High-resolution heterodyne spectrometer

(Lander payload is describe in Geraimov, Zasova and Ignatiev abstract-VET-2014).

Venera-D mission is sponsored by Roscosmos with potential participation NASA. Russia-US Venera-D Joint Science Definition Team has been formed in February 2014 to recommend a possible collaborative and coordinated implementation by considering the common aspects of Venera-D mission as presently defined, as well as the Venus Climate Mission recommended by the US Academies Decadal Survey of Planetary Science and the Venus Flagship mission studied by NASA in 2009. The team will provide its report by March 2015 and will likely lead to a coordinated or joint call for instruments and/or mission elements.

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