

The Venera-D Mission Concept for Exploring Venus

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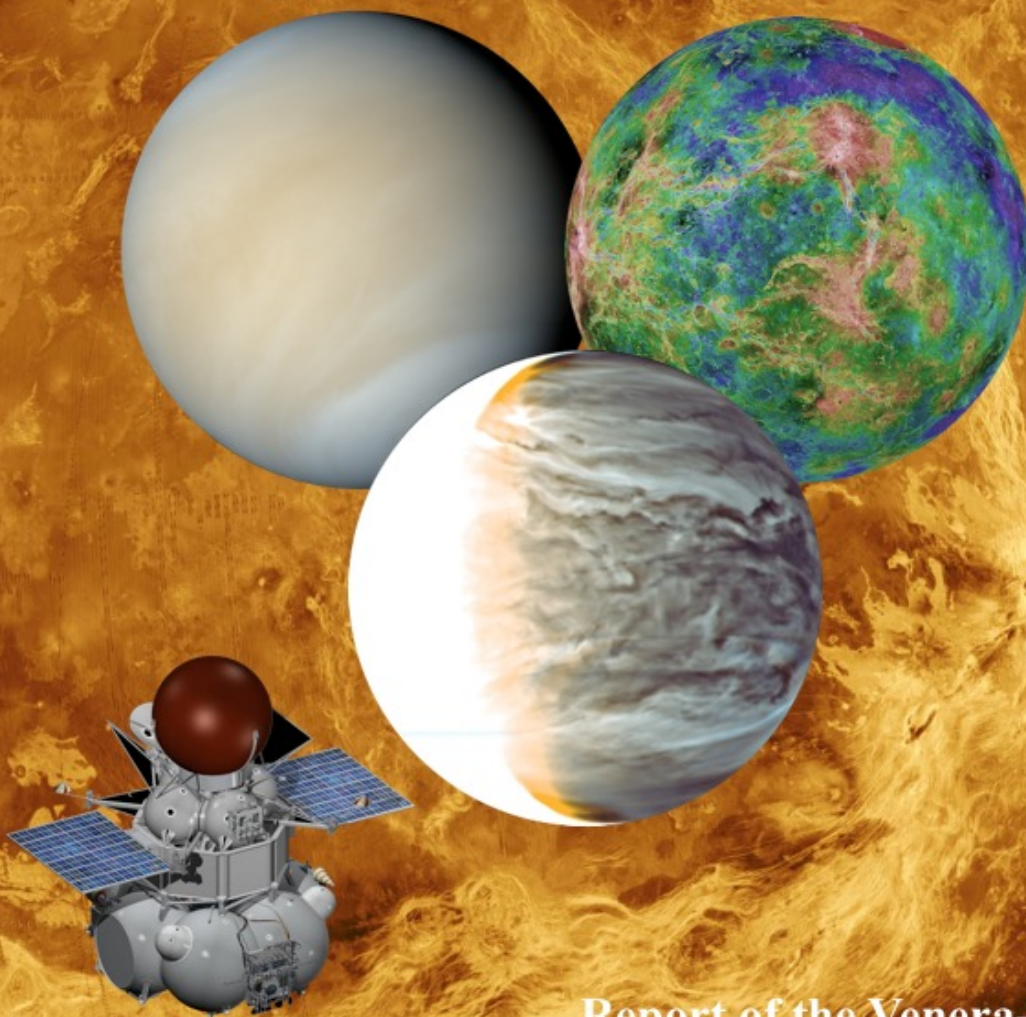
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Many questions remain unanswered regarding the current state of Venus. Its global cloud cover and superrotating winds in the deep atmosphere, as well as the surface morphology and mineralogy remain poorly sampled. A better understanding of the interior structure is also needed in addition to understanding the solar wind interaction with the planet. Venus Express' more than 8 year exploration of the planet's atmosphere has raised many new questions; likewise, JAXA's Akatsuki orbiter is revealing new facets of the atmosphere, adding to the complexity of the questions that define the Venus puzzle. Against this background, a Joint Science Definition Team (JSDT) chartered by NASA and IKI/Roscosmos have collaborated for the last year and a half to define the most crucial questions that must be explored in a new mission to Venus, while considering the science in the context of Russia's Venera-D baseline mission, originally conceived more than a decade ago.

Currently, the JSDT is assessing a mission architecture concept for the comprehensive investigation of Venus that would consist of an orbiter (>3 yr. of operation) and a lander (2 hrs. on the surface). The scientific goals of the concept are tied closely to the key objectives established by VEXAG and the NASA Planetary Decadal Survey, and include: investigation of the thermal structure and chemical composition of the atmosphere and clouds, abundances and isotopic ratios of the light and noble gases; study of the thermal balance, dynamics, and super-rotation of the atmosphere; determination of the surface mineralogy and elemental composition including key radioactive isotopes; study of potential current volcanic and electrical activity; and the study of the plasma environment, magnetosphere, and atmospheric escape. The JSDT is also evaluating technology needs and the potential for innovative flight element augmentations including, free flying aerial platforms, sub-satellites, and small long-lived surface stations. The study is continuing and will refine the mission architecture and potential instrument suite for the different flight elements.

Keywords: Venus , Mission, Orbiter, Lander, Aerial Platform, Surface Station

Venera-D: Expanding our Horizon of Terrestrial Planet Climate and Geology through the Comprehensive Exploration of Venus



**Report of the Venera-D
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