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VENERA-D AND FOLLOWING ROBOTIC MISSIONS TO EXPLORE VENUS

Abstract

Venus and Earth have formed approximately the same distance from the Sun, and are close in mass and volume: they should be the most similar pair of planets in the Solar System. How and when the two planets diverged in their evolutions? Did ocean and life exist in Venus's early history? Venera-D (D stands for "long-lived:" dolgozhivushaya) is a considered Roscosmos-led mission that combines simultaneous observations of Venus's surface, atmosphere, and plasma environment to try to answer these essential questions. Venera-D mission architecture, as recommended by Venera-D Roscosmos-NASA Joint Science Definition Team, would include an orbiter and a VEGA-style lander associated with a Long-lived In-Situ Solar System Explorer (LLISSE) provided by NASA. Optionally, a technology demonstration balloon may also be added. Further Venus exploration roadmap includes the second mission essentially repeating Venera-D with a more sophisticated aerial platform, to be launched on the nearest launch window. The two first missions would deliver two coordinated orbiters on elongated orbits, and provide an in-situ investigation of two selected landing sites. The following program, to be realized later, targets the delivery of a sample from Venus to the Earth. The launch of the first Venera-D mission is planned within 2029–2031.