CONCEPTS FOR EXPLORING THE SURFACE OF VENUS. G. A. Landis[1] and S. R. Oleson[2], [1]NASA John Glenn Research Center, 21000 Brookpark Road, Cleveland OH; geoffrey.landis@nasa.gov, [2]NASA John Glenn Research Center, 21000 Brookpark Road, Cleveland OH; steven.r.oleson@nasa.gov.

Introduction: Earth's sister planet, Venus, is the closest and the most similar to Earth in size and location in the solar system, as well as one of the most hostile surface environments in the solar system. The longest lived mission to the surface of Venus lasted only two hours, and no missions have landed on Venus since the last of the Soviet missions in the 1980s. Nevertheless, Venus is a planet of great scientific interest.

Technologies for Future Exploration: A number of advances in technology allow the possibility of designing future missions which may have long lifetimes operating on the surface of Venus. The primary difficulty is the high temperature, about 450°C on the surface, with the added difficulty of high pressure (about 92 bar) as well. Technologies being developed to work in this environment include high-temperature electronics, high temperature motors and mechanical components, high-temperature power systems, and design of radioisotope-powered Stirling-cycle cooling systems. A new environment simulation chamber, the Glenn Extreme Environment Rig (GEER), has recently become operational [1] to test materials and technologies under simulated Venus surface conditions.

Conceptual Mission Designs: A number of conceptual designs for Venus missions have been done, including landed missions, rover missions [2-4], and atmospheric balloon and aircraft missions [5]. As an alternate to a robotic mission, a mission was also studied incorporating telerobotics from an orbiting spacecraft [6].

Figure 1: conceptual design for a small wind-powered Venus lander.

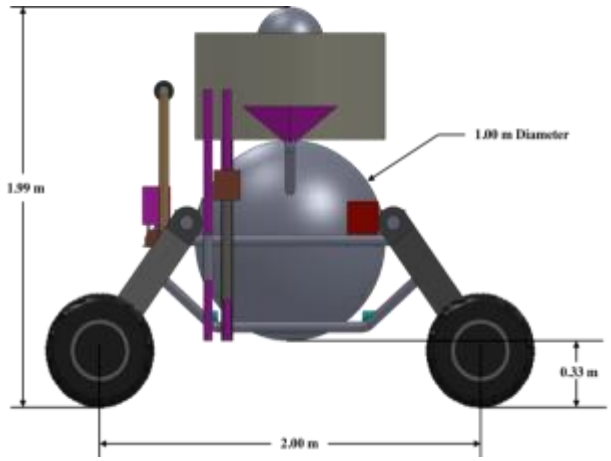

Figure 2: conceptual design for a Venus rover incorporating a radioisotope Stirling power supply and cooling system. [3]

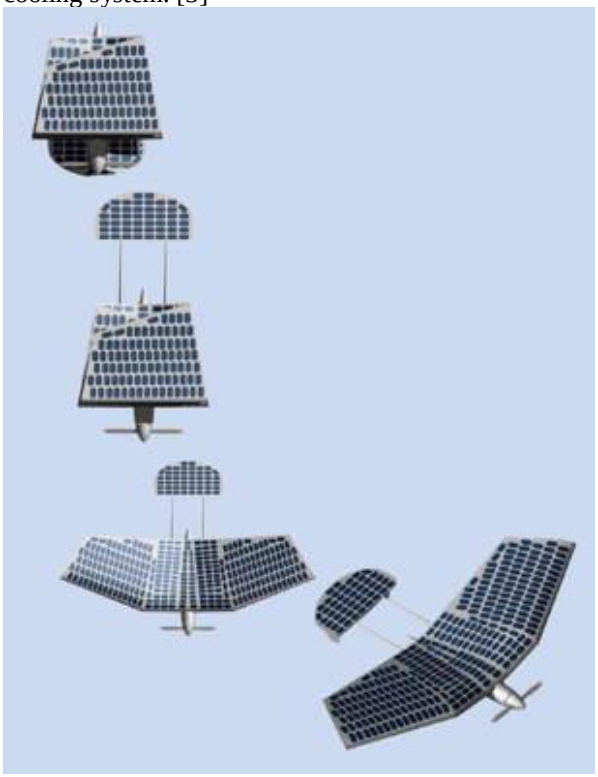

Figure 3: concept for deployment of a solar-powered aircraft for exploration of the Venus atmosphere

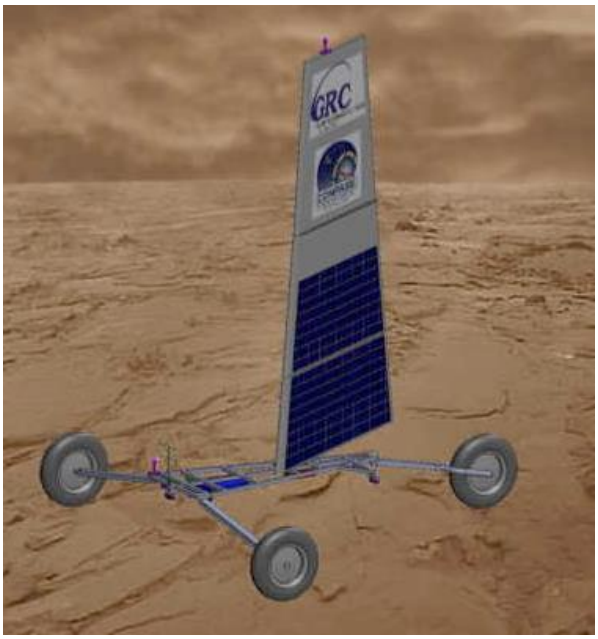

Figure 4: NASA Innovative Advanced Concepts (NIAC) Venus landsailing rover

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