

FY24 Strategic Initiatives Research and Technology Development (SRTD)

Verifying Venus Aerobot Instruments and Power Components Operate in a Simulated Venus Cloud Environment

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Strategic Focus Area: Technologies for Venus Cloud Environments /Venus In-Situ Aerosol Measurement Technologies | **Strategic** Initiative Leader: James A Cutts

Objectives

Approach and Results

- Develop a sulfuric acid droplet testing facility that would simulate the chemical and corrosive environment within the Venus cloud layer.
- Fabrication of the Venus Cloud Simulator chamber. A 200-liter glass reaction vessel is used to house testing articles for sulfuric acid aerosol exposure testing. The inlet and outlet for the entry and exit of sulfuric acid aerosol particles are positioned at the top of the reaction vessel. A drainage port is located at the bottom of the reaction vessel to drain excess aerosol particles.
- Test prototype components for a Venus balloon mission such as a solar array panel, balloon materials, and gondola materials.

Background

 JPL is actively developing Venus balloon technology to fly in the cloud layer as a mission concept.



- A prototype Venus balloon on a test flight →
- There are no current facilities that mimics the corrosive cloud layer found in the Venusian atmosphere.
 - Need to address risk of sulfuric acid exposure.
- The Venus Cloud Simulator will demonstrate that potential materials, components, and instruments would be robust against

 Lid Lifting Mechanism. Aerosol and filtering lines connect to the lid and are held against a lid lifting mechanism. An 80/20 material-based lid lifting mechanism utilizes a pulley system to lift the aerosol and filtering lines and access testing materials inside of the chamber.



corrosion for proposed Venus Aerobot missions.

Significance/Benefits to JPL and NASA

- The Venus Cloud Simulator will be a unique facility asset for JPL and NASA. It will be useful in testing components, materials, and instruments in an environment that simulates the corrosive Venus cloud layer. Ensuring that robust systems are designed, developed and fabricated will be essential for mission success.
- Working with the DaVinci Probe team to collaborate on testing various parachute material samples.
- Teaming with Glenn Research Center for conducting fundamental sulfuric acid aerosol property research.

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