National Aeronautics and Space Administration

REVOLUTIONIZING IN-SITU VENUS EXPLORATION

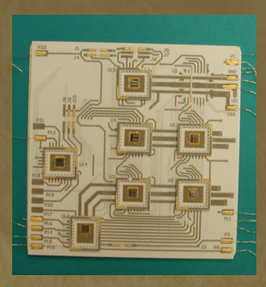
Presented by: Tibor Kremic | Chief, Space Science Project Office | NASA Glenn Research Center | Tibor.Kremic@nasa.gov | (216) 433-5003
Jeff Balcerski | Carol Tolbert | Gary Hunter | Tom Miller

SCIENCE GOALS

1. Estimate moment exchange between planet and atmosphere
2. Acquire temporal weather data to update global circulation models
3. Quantify near surface atmospheric chemistry variability

MEASUREMENTS

- Surface wind speed
- Wind direction (relative to surface)
- Surface temperature and pressure
- Near-surface chemical composition
- Net flux radiance
- All these are measured over a long time period



SiC Electronics Packaging

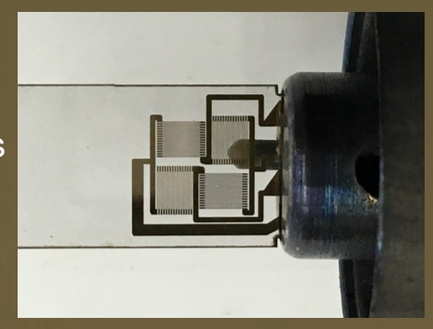
– Goals are to:

- Operate for a minimum of a half of one solar day, including at least one day/night transition.
- Take / transmit measurements at frequencies coordinated with orbiter communication window period.

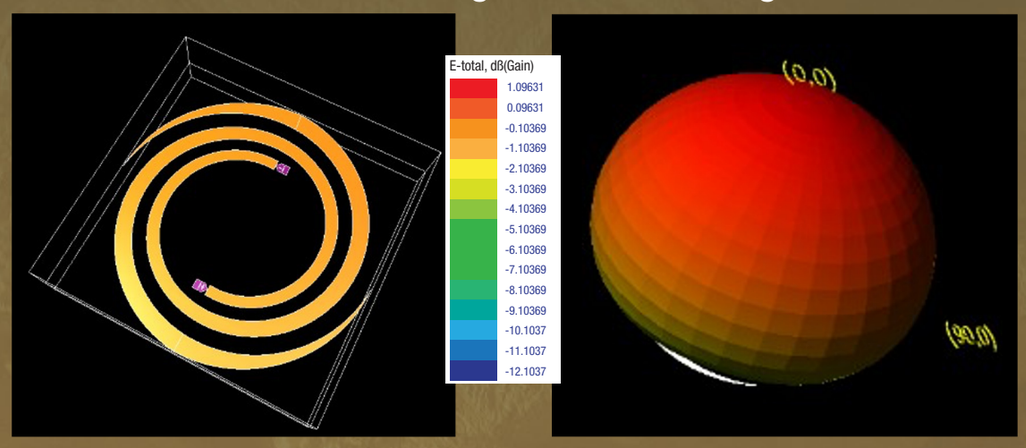
CURRENT STATUS

The LLISSE Project has continued to pioneer the development of Long Lived surface platforms. Advancements within the project include:

- Multi-cell batteries have demonstrated life well beyond the 60-day life under simulated LLISSE loads.
- The world's first demonstration of stable electrical operation of semiconductor integrated circuits (ICs) for 60 days in simulated Venus surface conditions
- Four chemical species sensors have shown operation for 60 days in Venus simulated conditions and active in-situ monitoring of SO2 concentrations
- Multiple sensors have been tested with their driving electronics in Venus simulated conditions.
- Transistors associated with lower frequency communications have been demonstrated and work continues on antenna design and fabrication.
- Electronic circuits with the capability to provide operability for LLISSE have been designed and are being fabricated.



Strain gauge wind sensor

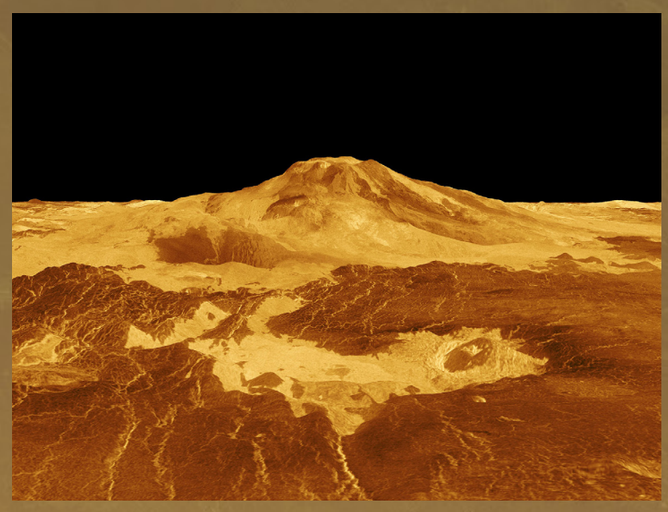


Baseline Spiral Communications Antenna Design and Resulting Radiation Pattern at 100 MHz

Advanced Thermal Batteries 1/3 scale developmental battery design deliverable

ENVIRONMENT

There is no question that the environment of Venus is harsh. Surface temperatures are around 460°C, and the pressure is about 90 BAR (similar to being ~3,000 ft under water on Earth). We are solving the problems this environment has traditionally posed by living harmoniously in the environment as opposed to fighting the elements. The battery powered option uses batteries designed to tolerate high temperatures. LLISSE uses high temperature electronics, communications, and sensors to enable low volume and high impact data transmitted to orbiters and relayed back to Earth.



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