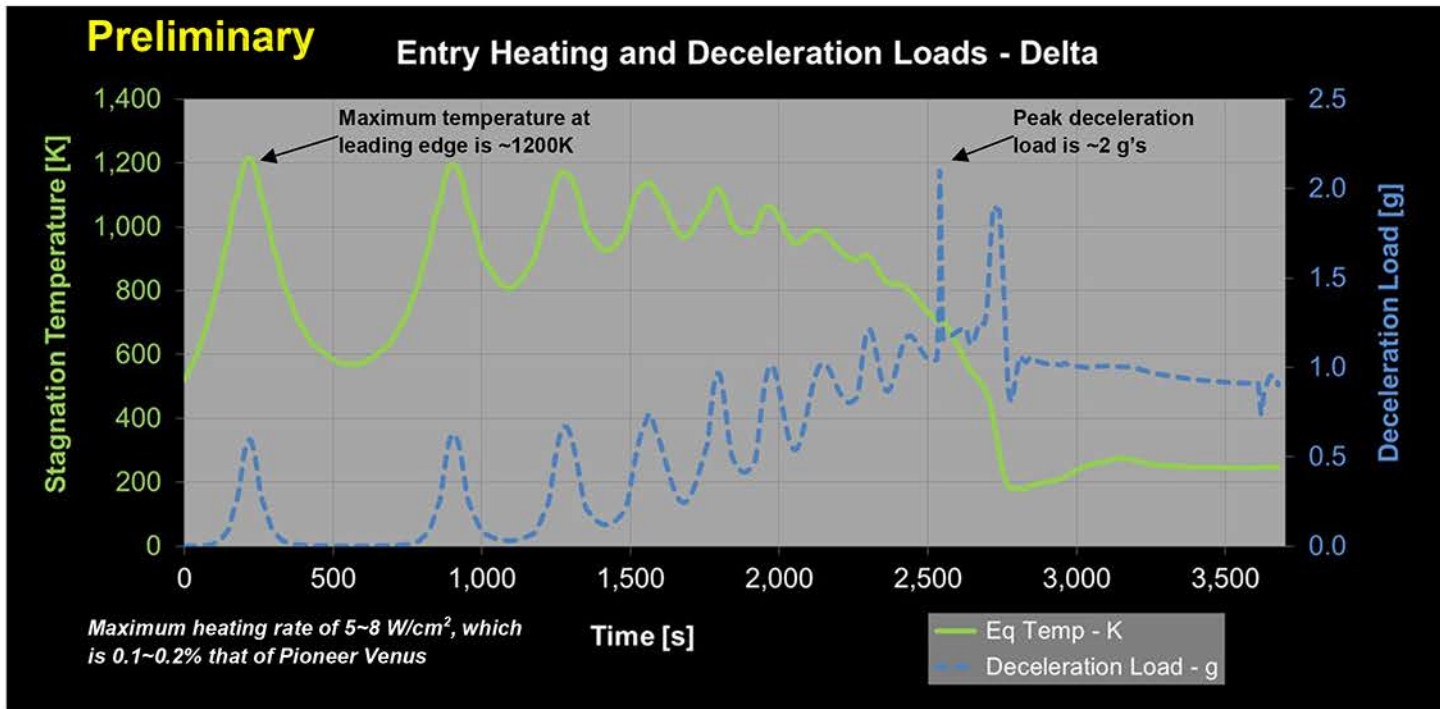


# Venus Atmospheric Maneuverable Platform (VAMP)

Benign entry loads enable robust and extended investigation of Venus atmosphere

## Ultra-low ballistic coefficient entry

- Large surface area to mass ratio produces benign loads during entry
- Benign entry enables data collection during descent
- No aeroshell is needed, thereby maximizing available science payload mass

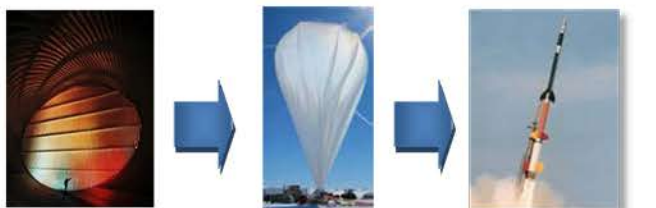


## Lifetime of months to years

- Lifetime limited only by gradual loss of buoyant gas and/or environmental effects
  - Day-side operational mode is propelled flight with altitude controlled as desired between 52 km and 68 km.
- Night-side operational mode is balloon-like, passive floatation at 52-54 km range.

## Reduced mission risk

- Simple day-night operations and power cycling
- Passive floating state during safe mode or power/propeller failure
- Vehicle buoyantly floats, providing several weeks of recovery window before ambient winds sweep vehicle into polar vortex
- Design is relatively insensitive to payload mass creep
- Most technology risks will be retired by our terrestrial demonstrations/tests



Lab testing with sub-scale Ems  
 Balloon release of demo vehicle  
 Sounding rocket flight of demo vehicle  
 Image Credits: Lab (NASA Langley), Balloon (NASA Wallops), Rocket (NASA Wallops)

## Lifting Entry Atmospheric Flight (LEAF) System

- LEAF system combines our world-class expertise in unmanned aircraft, semi-buoyant vehicles, space systems and deployable/ inflatable entry technologies
- Enables deployment of “atmospheric rovers”
- Adaptable to various planetary bodies with atmospheres (e.g., Venus, Mars, Titan)



- |   |   |  |
|---|---|--|
| <p><b>Venus (VAMP)</b></p> <ul style="list-style-type: none"> <li>• Benign entry loads</li> <li>• Long-lived flight</li> <li>• Delivery of drop sondes</li> </ul> | <p><b>Mars</b></p> <ul style="list-style-type: none"> <li>• Benign entry loads</li> <li>• Controlled delivery of landers, rovers, etc to surface</li> </ul> | <p><b>Titan</b></p> <ul style="list-style-type: none"> <li>• Benign entry loads</li> <li>• Long-lived flight</li> <li>• Delivery of landers, boats, rovers, etc</li> </ul> |
|---|---|--|

Image Credits: Venus (NASA SSE), Mars (NASA SSE), Titan (NASA Cassini-Huygens)

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