Venus Atmospheric Maneuverable Platform (VAMP) Science Vehicle Concept

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Abstract

The Northrop Grumman Aerospace Systems and L'Garde team has continued to investigate a capability to provide a long-lived, maneuverable platform to explore the Venus upper atmosphere. This capability is an implementation of our Lifting Entry/Atmospheric Flight (LEAF) system concept, and the Venus implementation is called the Venus Atmospheric Maneuverable Platform (VAMP). The VAMP concept utilizes ultra-low ballistic coefficient (< 50 Pa), semi-buoyant aircraft that deploys prior to entering the Venus atmosphere, enters without an aeroshell, and provides a long-lived (months to years) maneuverable vehicle capable of carrying science payloads to explore the Venus upper atmosphere.

In this presentation we provide an update on the air vehicle design and plans for future trade studies, analyses, and prototyping to advance and refine the concept. We will discuss the air vehicle's entry CONOPs and atmospheric science operations. We will present a strawman concept of VAMP, including ballistic coefficient, planform area, percent buoyancy, inflation gas, wing span, vehicle mass, power supply, propulsion, materials considerations, structural elements, subsystems, and packaging. In this context, we will discuss key factors impacting the design and performance of VAMP and the interdependencies of these factors and the manner in which the VAMP strawman characteristics affect the CONOPs and the science objectives.

We will show how the these factors provide constraints as well as enable opportunities for novel long duration scientific studies of the Venus upper atmosphere that support VEXAG atmosphere goals. We will also discuss how the VAMP platform itself can facilitate some of these science measurements.