Paper ID: 76219
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IAF SPACE EXPLORATION SYMPOSIUM (A3)
Interactive Presentations - IAF SPACE EXPLORATION SYMPOSIUM (IPB)

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RIDING THE ATMOSPHERIC CURRENTS OF VENUS: AN SLS LAUNCHED VENUS BALLOON-SPACECRAFT MISSION

Abstract

This paper explores the capability of the new NASA Space Launch System (SLS) to deliver an inflatable Zeppelin type spacecraft and science package to the atmosphere of Venus. The Balloon and spacecraft would ride the stratified and dynamic wind currents of Venus. Having the capability to vary its altitude, this system would, over many months, flyover and view large segments of the surface of Venus, including its poles and highest mountain ranges. The mission fulfils two roles: first it serves as a scientific platform for the investigation of Venus and second, it will serve as a technology demonstrator for later, more ambitious missions to explore the atmospheres of the gas giant planets Jupiter, Saturn, Uranus and Neptune. Venus exploration would include terrain mapping the surface, study of its magnetic field, surveys of volcanic activity, studies of the conditions at the poles as well as atmospheric studies of the Venusian environment. In addition to its science tasks, the Balloon spacecraft system would have the ability to deploy probes and small helicopter. With the new SLS Exploration Upper Stage (EUS), the largest upper stage ever produced (in development now), the enhanced SLS 1B configuration will deliver more payload to Venus than other launch vehicles, allowing for significantly increased science return from this unique and atmospherically driven planet. In this paper a brief description is given of the new SLS Block 1B configuration, along with, information describing the trajectory to Venus, the Venus Balloon-spacecraft system, and its operations and challenges. This work is done by the Boeing Exploration Launch Systems division in Huntsville Alabama, USA and the Boeing Advanced Systems group in Houston, Texas, USA. This presentation will highlight the SLS abilities, over the next 20 years, to inject robust, high science value payloads to destinations throughout the Solar system.