

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)

New missions enabled by Extra-large launchers (8)

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ADDITIONAL SPACE EXPLORATION MISSION OPPORTUNITIES FOR THE ARES-V LAUNCH SYSTEM

Abstract

Additional Space Exploration Mission Opportunities for the Ares-V Launch System. Several space exploration missions, each taking advantage of the large payload to orbit capability and payload faring volume of the Ares V are described. There are flagship science missions that could take advantage of the Ares V capability; the missions discussed in this paper were chosen because of the significant increase in mission capability, science return or architecture robustness they might provide for future space exploration. Missions include:

Large Space Telescope Deployments. The Ares V could send as much as 56 mt to the Sun-Earth Lagrange Point 2 (SEL2) region; with a payload shroud diameter of 10 m and a total usable length of 17.2 m this would provide a useable payload volume of 860 m³, allowing for very large monolithic optics. Near Earth Object (NEO) Mission with Orion. Human exploration of NEOs offers numerous benefits to NASA including operational experience beyond cis-lunar space; in situ resource utilization evaluation; and rich scientific return. This mission could be a useful precursor to long duration crew Mars missions. The Ares-V can deliver, in addition to the Orion spacecraft, an up rated service module (SM) and a kit to allow for long duration space flight (150 days).

Mars Sample Return (MSR) Missions. Injecting 5 times the mass to Trans-Mars injection (TMI) of the Delta-IV Heavy, the Ares-V supports important options for the MSR mission that are impractical for EELVs; the option for a Direct Earth Return Mode (DRM) is an example; allowing the elimination of complicated rendezvous in Mars orbit, of the Mars ascent stage and the Mars orbiter, necessary for sample transfer. Mission reliability can be increased significantly as Mars orbit operations can be avoided entirely.

A LEO Propellant Depot formed from derivatives of the Ares V Earth Departure Stage (EDS) system offer significant leverage in adding payload capability to the Altair lunar lander system. Using the Altair, an EDS, normally 60

This paper will describe the Ares-V vehicle, stages, operations, major components and injection capability to enable these high value science missions. The presentation will include high definition simulations and visualizations of one or more of these missions as well as the Earth to orbit flight of the Ares-V vehicle.

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