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SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Space Transportation Solutions for Deep Space Missions (8-A5.4)

Author: Mr. Steve Creech
National Aeronautics and Space Administration (NASA), United States

Mr. Chris Crumbly
NASA MSFC, United States
Ms. Kimberly Robinson
National Aeronautics and Space Administration (NASA), Marshall Space Flight Center, United States

NASA'S SPACE LAUNCH SYSTEM: AN EVOLVING CAPABILITY FOR EXPLORATION

Abstract

A foundational capability for international human deep-space exploration, NASA's Space Launch System (SLS) vehicle represents a new spaceflight infrastructure asset, creating opportunities for mission profiles and space systems that cannot currently be executed. While the primary purpose of SLS, which is making rapid progress towards initial launch readiness in two years, will be to support NASA's Journey to Mars, discussions are already well underway regarding other potential utilization of the vehicle's unique capabilities. In its initial Block 1 configuration, capable of launching 70 metric tons (t) to low Earth orbit (LEO), SLS is capable of propelling the Orion crew vehicle to cislunar space, while also delivering small CubeSat-class spacecraft to deep-space destinations. With the addition of an upper stage, the Block 1B configuration of SLS will be able to deliver 105 t to LEO and enable more ambitious human missions into the proving ground of space. This configuration offers opportunities for launching co-manifested payloads with the Orion crew vehicle, and a class of secondary payloads, larger than today's CubeSats. Further upgrades to the vehicle, including advanced boosters, will evolve its performance to 130 t in its Block 2 configuration. Both Block 1B and Block 2 also offer the capability to carry 8.4- or 10-m payload fairings, larger than any contemporary launch vehicle. With unmatched mass-lift capability, payload volume, and C3, SLS not only enables spacecraft or mission designs currently impossible with contemporary EELVs, it also offers enhancing benefits, such as reduced risk, operational costs and/or complexity, shorter transit time to destination or launching large systems either monolithically or in fewer components. This paper will discuss both the performance and capabilities of Space Launch System as it evolves, and the current state of SLS utilization planning.