NASA's Space Launch System: Deep-Space Delivery for SmallSats

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Abstract

Designed for human exploration missions into deep space, NASA's Space Launch System (SLS) represents a new spaceflight infrastructure asset, enabling a wide variety of unique utilization opportunities. While primarily focused on launching the large systems needed for crewed spaceflight beyond Earth orbit, SLS also offers a game-changing capability for the deployment of small satellites to deep-space destinations, beginning with its first flight. Currently, SLS is making rapid progress toward readiness for its first launch in two years, using the initial configuration of the vehicle, which is capable of delivering more than 70 metric tons (t) to Low Earth Orbit (LEO). On its first flight, an uncrewed test of the Orion spacecraft into distant retrograde orbit around the moon, accompanying Orion on SLS will be 13 small-satellite secondary payloads, which will deploy in cislunar space. These secondary payloads will include not only NASA research, but also spacecraft from industry and international partners and academia. The payloads also represent a variety of disciplines including, but not limited to, studies of the moon, Earth, sun, and asteroids. The Space Launch System Program is working actively with the developers of the payloads toward vehicle integration. Following its first flight and potentially as early as its second, SLS will evolve into a more powerful configuration with a larger upper stage. This configuration will initially be able to deliver 105 t to LEO, and will continue to be upgraded to a performance of greater than 130 t to LEO. While the addition of the more powerful upper stage will mean a change to the secondary payload accommodations from those on the first launch, the SLS Program is already evaluating options for future secondary payload opportunities. Early discussions are also already underway for the use of SLS to launch spacecraft on interplanetary trajectories, which could open additional opportunities for small satellites. This presentation will include an overview of the SLS vehicle and its capabilities, including the current status of progress toward first launch. It will also explain the opportunities the vehicle offers for small satellites, including an overview of the CubeSat manifest for Exploration Mission-1 in 2018 and a discussion of future capabilities.