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SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Going To and Beyond the Earth-Moon System: Human Missions to Mars, Libration Points and NEO's (8-A5.4)

Author: Mr. Chris Crumbly
NASA MSFC, United States

Mr. David Alan Smith
NASA, United States

DEVELOPMENT OF THE SPACE LAUNCH SYSTEM MISSION PLANNERS GUIDE FOR BEYOND EARTH ORBIT MISSIONS

Abstract

NASA Marshall Space Flight (MSFC) has successfully completed the Preliminary Design Review (PDR)of the heavy lift Space Launch System (SLS). The first two SLS flights will use a Block 1 vehicle configuration capable of delivering 70mT to Low Earth Orbit (LEO). The Block 1 Core Stage uses Shuttle derived 5-segment Reusable Solid Rocket Motors (RSRMV), 8.4m Shuttle derived Main Tank, and 4 RS-25 Shuttle derived Maine Engines. These test flights are plannes for 2017 (un-screwed lunar fly-by) and 2021 (crewed lunar orbit) where they will validate critical launch capabilities on SLS and life support systems on the Multi Purpose Crew Vehicle (MPCV). However, this representes just an initial capability. The United States Congress mandated s SLS "system capable of carrying a total of 130 mT to LEO in preparation for transit for missions Beyond Earth Orbit (BEO). The SLS shall, to the extent practical, incorporate capabilities for evolutionary growth to carry heavier payloads". This paper will provide details on the evolution of post SLS Block 1 configurations providing a 130 mT capability from the perspective of the SLS Mission Planners Guide. The SLS Mission Planners Guide serves an an information resource between NASA, industry, and the scientific community for understanting the potential range of the SLS mission capability. It also promotes a two-way dialogue between the vehicle developers and vehicle users to on how to most efficiently evolve the SLS mission/payload capabilities. This in turn helps NASA identify and prioritize different trade studies and potential technology investment paths required to achieve a preferred mass to destination capability. It is a goal of this paper to engage potential users of the SLS to continue the discussion regarding performance improvements that can ultimately lead to increased, cost effective SLS mission capture.