

**NASA's SPACE LAUNCH SYSTEM PAYLOAD TRANSPORTATION BEYOND LEO.** S. D. Creech<sup>1</sup>, D. A. Smith<sup>2</sup>, <sup>1</sup>NASA/MSFC Huntsville, AL 35812, [steve.creech@nasa.gov](mailto:steve.creech@nasa.gov), <sup>2</sup>NASA/MSFC Huntsville, AL 35812, [david.a.smith-3@nasa.gov](mailto:david.a.smith-3@nasa.gov)

**Introduction:** NASA has successfully completed the Critical Design Review (CDR) of the heavy lift Space Launch System (SLS) and is working towards the first flight of the vehicle in 2019. SLS will begin flying crewed missions with an Orion capsule to the lunar vicinity every year after the first 2 flights starting in the early 2020's. As early as 2021, in addition to delivering an Orion capsule to a cislunar destination, SLS will also deliver ancillary payload, termed "Co-manifested Payload (CPL)", with a mass of at least 6 mT and volume up to 280 m<sup>3</sup> simultaneously to that same destination. Later SLS flights have a goal of delivering as much as 10 mT of CPL to cislunar destinations.

In addition to cislunar destinations, SLS flights may deliver non-crewed, science-driven missions with Primary Payload (PPL) to more distant destinations. SLS PPL missions will utilize a unique payload fairing offering payload volume up to 540 m<sup>3</sup> that greatly exceeds the volume of available Expendable Launch Vehicle (ELV) fairings. The Characteristic Energy (C3) offered by the SLS system will generate opportunities to deliver up to 40 mT to cislunar space in the early 2020's. This capability will also be a performance multiplier for spacecraft going to outer planet destinations by providing, for example, opportunities to double mass or halve flight time. Europa Clipper is planning to take advantage of this capability arriving at a Jovian destination in under 3 years compared to the 7+ years cruise time provided by current launch systems.

Rideshare and Secondary Payload (SPL) opportunities as part of future crew and cargo missions range from 6U Cubesats to the largest ESPA (Evolved Expendable Launch Vehicle {EELV} Secondary Payload Adapters) class payloads. Accommodations include Commercial Off the Shelf (COTS) Cubesat Deployers and other larger COTS payload carrier systems. User demand for SLS provision of a propulsive ESPA class accommodation is also being evaluated.

This presentation will describe ground and flight accommodations, interfaces, resources, and performance planned to be made available to potential CPL, PPL, and SPL on SLS. In addition, this presentation should promote a dialogue between vehicle developers, potential science payload users in order to most efficiently evolve required SLS capabilities to meet diverse payload needs as they are identified over the next 35 years and beyond.