

NASA'S SPACE LAUNCH SYSTEM: UNMATCHED VOLUME FOR DEEP SPACE TELESCOPES. Dr. Kimberly F. Robinson¹ and Robert W. Stough², ¹NASA's Space Launch System Program, Kimberly.f.robinson@nasa.gov, ²NASA's Space Launch System Program, robert.w.stough@nasa.gov

With wide-diameter fairings in varying lengths, NASA's new super heavy-lift launch vehicle, the Space Launch System (SLS), offers unparalleled payload volume for large space telescopes of the future. As the Block 1 vehicle for the first flight nears completion, progressively more powerful variants – Block 1B and Block 2 – are already in the development phase. Available in crew and cargo configurations, SLS will provide safe, reliable transportation for crew as well as science payloads, such as Large Strategic Science Missions. Following three flights of SLS Block 1, the Block 1B vehicle will be available in the 2020s. In the crew configuration, the Block 1B and Block 2 launchers will carry astronauts in the Orion spacecraft as well as co-manifested payloads in its Universal Stage Adapter (USA), which will offer about 285 m³ of usable volume – more than the payload envelope of a standard 5 m-diameter shroud and able to accommodate some of smaller concepts being studied and provide a cost-effective launch. In their cargo configurations, the Block 1B and Block 2 vehicles can launch with a 19.1 m long, 8.4 m-diameter fairing with a usable volume of 621 m³ – nearly three times greater than industry-standard 5 m-diameter fairings. Even larger fairings, in the 10 m-diameter class, are also being studied, especially for the Block 2 launcher. In addition to its greater payload envelope, the Block 1B vehicle will be able to launch at least 37-40 metric tons (t) of mass to a Sun-Earth LaGrange Point. Currently, SLS is in its final phases of testing and assembly for first launch. The first vehicle, a Block 1 crew configuration, will be used for an uncrewed test flight, known as Exploration Mission-1 (EM-1). Several elements of that vehicle are complete and have been delivered to the Exploration Ground Systems (EGS) Program at Kennedy Space Center (KSC) in Florida, which has responsibility for stacking and launching SLS and Orion. Both the SLS Program, managed out of Marshall Space Flight Center (MSFC) in Huntsville, Alabama, and EGS have built a modernized, robust infrastructure for manufacturing, testing, ground processing and launching America's deep space exploration system. NASA has made these investments to enable bold deep space missions in the 2020s, 2030s and beyond.