
Introduction: This paper describes the latest developments in Astrobotic’s lunar payload delivery service, along with a proposed model for science and exploration participation on this service. Topics addressed here include Astrobotic’s technical capabilities, business updates, and a proposed NASA solicitation vehicle for science and exploration communities to utilize the service.

Technical Capabilities: In June 2016 at the Berlin Air Show, Astrobotic publicly unveiled the Peregrine Lunar Lander, the spacecraft that will carry customer payloads on Astrobotic’s first five commercial missions to the Moon. Peregrine is a modular spacecraft that can carry a diverse collection of payloads from a variety of customers on a single mission. The vehicle has a 35kg payload capacity on its first mission, and will fly as a secondary payload on a SpaceX Falcon 9 launch to geosynchronous transfer orbit (GTO). With minimal configuration changes in tank volume and trajectory, future Peregrine missions can host up to 265kg of payload. Payload customers for Peregrine’s first mission can purchase delivery service to lunar orbit or the lunar surface at $1.2 million per kilogram.

Following deployment at GTO by the Falcon 9, Peregrine’s ISE-100 propulsion system (built by Aerojet Rocketdyne) will conduct a translunar injection burn. Peregrine will then enter a cruise to the Moon that lasts no more than 4 months. Following this coast, Peregrine carries out maneuvers to enter a 100km near-polar orbit around the Moon. Once in lunar orbit, Peregrine deploys orbital payloads, and then makes a powered descent to the surface. About 55 hours after local sunrise, Peregrine lands on the lunar surface. Following post-landing check out, surface payloads are activated, and Peregrine provides payloads power and communication for the duration of the 8 Earth-day mission. With each kilogram of service purchased, payloads are provided 0.5 watts of power, and 2.8 kbps of data bandwidth. Payload data is transmitted to Earth through Peregrine’s direct to Earth communication system, and received by the Swedish Space Corporation ground system for distribution to customers around the world. For those payloads that are deployed to the surface, a wireless communication protocol is provided by Peregrine.

Business Updates: In addition to unveiling Peregrine at the Berlin Air Show, Astrobotic also announced two new partners are supporting the company in its development of a lunar payload delivery service. Airbus Defence and Space, the world’s second largest aerospace company, is providing Astrobotic initial engineering support as the company advances its lander design to a preliminary design review. The decision to support Astrobotic came after a deep review that concluded, “Airbus Defence and Space clearly regards Astrobotic as the front runner in commercial lunar transportation services.” [1] DHL, the world’s largest logistics provider, was also announced in Berlin as the “Official Logistics Provider to the Moon.” DHL is providing logistics services for the transport of the Peregrine lander to and from assembly facilities, test sites, and launch site. DHL is also providing these services for all Astrobotic payload customers.

These partnerships supplement the existing NASA Lunar CATALYST partnership, which continues to provide Astrobotic access to NASA spacecraft engineers and facilities, as part of NASA’s effort to encourage the development of U.S. commercial robotic lunar lander capabilities. Between NASA, Airbus DS, DHL, and Aerojet Rocketdyne, Astrobotic has assembled a world-class team to open access to the Moon. Astrobotic has 10-signed deals toward its first mission, and is nearing completion of its payload manifest for Mission One.

Model for Science and Exploration: The science and exploration communities are now well positioned to make use of this world-class team, and carry out new activities on the Moon. Astrobotic recommends space agencies in particular partner with these communities to make use of this service. Already the Mexican Space Agency, AEM, has signed for a reservation that will deliver a lunar exploration payload determined by an RFP. NASA could utilize a similar model through the use of an “Indefinite Delivery, Indefinite Quantity” (IDIQ) solicitation of payload delivery service, which could outfit Peregrine with additional science and exploration payloads. An IDIQ call could streamline and facilitate the process for sending small to medium sized payloads that have been presented at LEAG and other venues.