First Results from NASA's Lunar Atmosphere and Dust Environment Explorer (LADEE)

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As of early August, 2013, the Lunar Atmosphere and Dust Environment Explorer (LADEE) mission is scheduled for launch on a Minotaur V rocket from Wallops Flight Facility during a five-day launch period that opens on Sept. 6, 2013 (early Sept. 7 UTC).

LADEE will address 40 year-old mysteries of the lunar atmosphere and the question of levitated lunar dust. It will also pioneer the next generation of optical space communications. LADEE will assess the composition of the lunar atmosphere and investigate the processes that control its distribution and variability, including sources, sinks, and surface interactions. LADEE will also determine whether dust is present in the lunar exosphere, and reveal its sources and variability. These investigations are relevant to our understanding of surface boundary exospheres and dust processes occurring at many objects throughout the solar system, address questions regarding the origin and evolution of lunar volatiles, and have potential implications for future exploration activities.

Following a successful launch, LADEE will enter a series of phasing orbits, which allows the spacecraft to arrive at the Moon at the proper time and phase. This approach accommodates any dispersion in the Minotaur V launch injection. LADEE's arrival at the moon depends on the launch date, but with the Sept. 6 launch date it should arrive at the Moon in early October. The spacecraft will approach the moon from its leading edge, travel behind the Moon out of sight of the Earth, and then re-emerge and execute a three-minute Lunar Orbit Insertion maneuver. This will place LADEE in an elliptical retrograde equatorial orbit with an orbital period of approximately 24 hours. A series of maneuvers is then performed to reduce the orbit to become nearly circular with a 156-mile (250-kilometer) altitude. Spacecraft checkout and science instrument commissioning will commence in early-October and will nominally span 30 days but can be extended for an additional 30 days in the event of contingencies. Following commissioning, the 100-day Science Phase is performed at an orbit with periapsis between 20–60 km. This orbit must be constantly managed due to the Moon’s highly inhomogeneous gravity field. During the Science Phase, the moon will rotate more than three times underneath the LADEE orbit.

LADEE employs a high heritage instrument payload: a Neutral Mass Spectrometer (NMS) from Goddard Space Flight Center, an Ultraviolet/Visible Spectrometer (UVS) from Ames Research Center, and a dust detection experiment (LDEX) from the University of Colorado/LASP. It will also carry the Lunar Laser Communications Demonstration (LLCD) as a technology demonstration. The LLCD is funded by the Human Exploration Operations

Mission Directorate (HEOMD), managed by GSFC, and built by the MIT Lincoln Lab.

Contingent upon LADEE's successful lunar orbit insertion and checkout, we will report the early results from the science investigations.

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