

SPACE EXPLORATION SYMPOSIUM (A3)  
Moon Exploration – Part 1 (2A)

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THE LUNAR ATMOSPHERE AND DUST ENVIRONMENT EXPLORER (LADEE) MISSION

**Abstract**

The Lunar Atmosphere and Dust Environment Explorer (LADEE) is a recent lunar science orbiter mission which launched in September 2013 to study the pristine state of the lunar atmosphere and dust environment prior to significant human activities. LADEE operated for 8 months, and successfully investigated the composition of the lunar atmosphere and the processes that control its distribution and variability, including sources, sinks, and surface interactions. LADEE also characterized dust in the lunar exosphere, and revealed processes that contribute to its sources and variability. These investigations are relevant to our understanding of surface boundary exospheres and dust processes throughout the solar system, address questions regarding the origin and evolution of lunar volatiles, and have potential implications for future exploration activities. LADEE employed a high heritage science instrument payload including a neutral mass spectrometer, ultraviolet spectrometer, and dust sensor. In addition to the science payloads, LADEE carried a laser communications system technology demonstration which proved high bandwidth long-haul capability, providing a building block for future space communications architectures. In addition to its primary science mission, LADEE also demonstrated the effectiveness of a low-cost, parallel development program, utilizing a modular bus design. LADEE also launched on the new Minotaur V launch vehicle, demonstrating its capability for deep space missions. These capabilities could enable future lunar missions in a highly cost constrained environment. This paper will describe the LADEE objectives, mission design, technical approach, operations, and results.