The Lunar Dust Experiment (LDEX) on the LADEE spacecraft has recorded over 11,000 unambiguous dust impacts since arriving at the Moon in October, 2013.

These findings confirm that there is a dust cloud engulfing the Moon, which is sustained by the continual bombardment of interplanetary dust particles.

Intermittently, LDEX also observes intense bursts of particles, likely related to ejecta particles from the surface, generated in an impact close to LADEE’s path, minutes before their detection.

The discovery of the lunar dust exosphere opens the door to new approaches to surface composition studies and will improve our hazard estimates of large (> 100 µm) dust impacts.
• The LACE experiment on Apollo 17 detected argon in the lunar atmosphere. However, it was not initially found by the LAMP instrument on LRO, leading to debate over whether argon was a component of the lunar atmosphere.

• The LADEE neutral mass spectrometer (NMS) has resolved this puzzle by not only detecting argon, but also mapping out how argon moves over the course of a lunar day.

• The NMS findings indicate that a very thin layer of Argon sticks to the surface on the cold nightside of the moon (much like frost is deposited during the night on Earth) and is released as the sun heats the surface. After release, these atoms do not immediately escape from the moon, as gravity keeps them within the orbit and they bounce off the warmer daytime surface where they can be detected by the NMS.

• This data set provides the basis for higher fidelity models of the interaction of argon and other gases with the lunar surface, and by extension to other bodies in the solar system that have very thin atmospheres.
The Ultraviolet/Visible Spectrometer (UVS) has made unprecedented systematic maps of sodium in the lunar atmosphere.

UVS finds that the sodium abundance varies with lunar phase, increasing as the Moon approaches its fullest. Additionally, the sodium abundance increases with meteoroid showers, but decreases when it is shaded from the solar wind by the Earth’s magnetotail.

These changes suggest a combination of sodium sources, including solar wind particles and meteoroids bombarding the surface releasing sodium from the rocks and soil.

These variations, combined with other LADEE observations, will constrain the processes at work at the Moon, and other airless bodies in the Solar System.
The Moon as a Collector of the Solar Wind: Simultaneous LADEE NMS and ARTEMIS ESA Measurements of $^4$He

LADEE Neutral Mass Spectrometer (NMS) measurements of lunar helium (black points) at sunrise show remarkable agreement with ARTEMIS Electrostatic Analyzer (ESA) measurements of the supply of helium delivered from the Sun by the solar wind (red line), derived under the assumption that helium resides for an average of only four days around the Moon before again escaping into interplanetary space. The combination of LADEE and ARTEMIS measurements confirm that the solar wind is the major source of helium in the lunar atmosphere, in stark contrast to argon, which is primarily derived from the Moon's own elements.
LADEE has discovered an unexpected population of carbon-bearing ions around the Moon

LADEE NMS ion scans utilized the Sun as an ionization source and the solar wind as an accelerator to detect new species in the lunar exosphere.

Carbon-bearing atoms in the lunar exosphere preserve an imprint of the delivery of volatiles to the lunar regolith by solar wind and micrometeorite bombardment over the Moon’s history.