

New findings expand Apollo observations of lunar atmosphere

July 18 2012



Moon. Image credit: NASA

In December 1972 the astronauts of Apollo 17-the last manned mission to the moon-deployed the Lunar Atmospheric Composition Experiment (LACE), a spectrometer designed to measure and characterize the thin lunar atmosphere. Forty years later, Stern et al. built upon those initial measurements, providing the first remotely-sensed measurement of the Moon's gaseous environment from lunar orbit. Using the Lyman Alpha Mapping Project's (LAMP's) far ultraviolet spectrograph aboard the Lunar Reconnaissance Orbiter, the authors determined the atmospheric concentration of helium.

By angling LAMP's sensors towards the lunar limb and comparing those observations against measurements of the interstellar background, the authors were able to estimate the helium concentration of the near-surface lunar environment. They calculate a density of 7,000 atoms per cubic centimeter at 120 degrees Kelvin (-244 degrees Fahrenheit), the assumed atmospheric temperature. The previous LACE observations ranged between 10,000 - 20,000 and 50,000 atoms per cubic centimeter depending on the time of day, increasing at nighttime and decreasing during the day. The nighttime decrease occurs because the atmosphere cools and contracts, yielding an increased density.

The authors suggest that the next steps should involve looking for spatial or temporal variations in lunar atmospheric helium. Such observations could help to determine whether the helium is produced locally by radioactive decay of lunar material or if it is formed from trapped and neutralized solar wind.

More information: Lunar atmospheric helium detections by the LAMP UV spectrograph on the Lunar Reconnaissance Orbiter, *Geophysical Research Letters*, [doi:10.1029/2012GL051797](https://doi.org/10.1029/2012GL051797), 2012

Provided by American Geophysical Union

Citation: New findings expand Apollo observations of lunar atmosphere (2012, July 18) retrieved 12 September 2024 from <https://phys.org/news/2012-07-apollo-lunar-atmosphere.html>

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