

**APOLLO 11 MOON LANDING: 50<sup>th</sup> Anniversary**



# Legacy of the Apollo 11 Moon Landing

## Looking Back Fifty Years

When Neil Armstrong, Buzz Aldrin, and Michael Collins first embarked on their journey to the Moon on July 16, 1969, no human had ever set foot on another celestial body. Armstrong and Aldrin made the first human footprints on the Moon on July 20, landing safely in Mare Tranquillitatis (Sea of Tranquility) on the side of the Moon that we see from Earth. The two astronauts remained within about 100 meters (around 300 feet) of the lunar module Eagle and spent approximately two and a half hours outside Eagle, collecting rock and soil samples and setting up science experiments while Collins orbited above in the command module Columbia.

## Revolution in Lunar Science

After the Apollo 11 astronauts splashed down in the Pacific Ocean on July 24, carrying rock and soil samples, we entered a new scientific era. At the time, little was known about the history and composition of Earth's nearest celestial neighbor. For the first time in history, scientists could analyze samples from another world. This allowed them to determine the age, composition, and other properties of the Moon and to learn more about the solar system itself.

## Returned Samples

The astronauts collected 21.7 kilograms (47.8 pounds) of samples which later revealed a wealth of information.

- The lunar maria (the dark patches one sees when looking at the Moon) are ancient volcanic lava flows.
- Early in its history, the Moon was nearly completely molten, covered in a layer of liquid rock. Since this discovery, the notion of an early “magma ocean” has been applied to all the rocky planets.
- The volcanic samples collected by Apollo 11 are old – roughly 3.6 billion years old. The Moon formed

about 4.5 billion years ago, so these samples have taught us about the Moon's early history.



*Apollo 11 crew: Commander Neil Armstrong, Command Module Pilot Michael Collins, and Lunar Module Pilot Buzz Aldrin.*

**Credit: NASA**

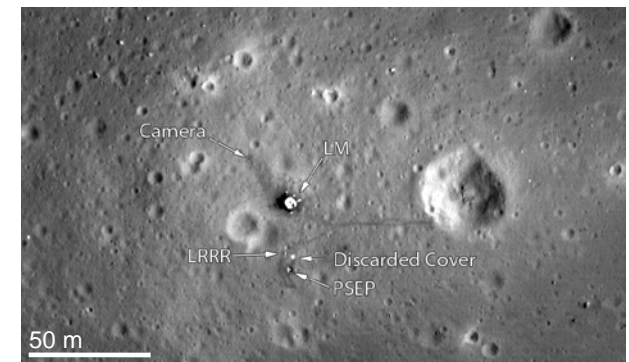
## Surface Experiments

The Apollo 11 astronauts deployed a small set of experiments during their short time on the lunar surface. The Solar Wind Composition Experiment collected particles of the solar wind (electrically charged particles emitted by the Sun), allowing the chemical composition of the solar wind to be measured. The Early Apollo Scientific Experiments Package (EASEP) consisted of three experiments. Along with two solar panels to provide power, an antenna and communications system to send data to Earth ground stations and receive commands, EASEP was composed of the following:

- Passive Seismic Experiment Package: detected lunar “moonquakes” and demonstrated the feasibility of lunar seismic exploration.
- Lunar Dust Detector: measured dust accumulation and radiation damage to the solar cells; the natural

dust accumulation on the experiment packages proved to be lower than predicted.

- Lunar Ranging Retroreflector: cube-shaped mirrors that reflect laser pulses directly back to Earth; the light travel time measures the Moon's distance with high accuracy and helps calibrate the scale of the solar system. This experiment is still in use today.



*The Lunar Reconnaissance Orbiter Camera's view of the Apollo 11 landing site. The dark paths around the Lunar Module (LM), Lunar Ranging Retroreflector (LRRR), and Passive Seismic Experiment Package (PSEP), are remnants of the astronauts' first steps. **Credit: NASA/GSFC/Arizona State University***

Apollo 11 was a landmark step in our exploration of the Moon. The subsequent Apollo missions added 360 kilograms (794 pounds) to the sample total along with additional sophisticated science experiments. Scientists continue to analyze the preserved samples and collected data with the most up-to-date tools. Since the Apollo era, NASA has continued to explore the Moon with robotic spacecraft, is currently conducting science at the Moon (with the Lunar Reconnaissance Orbiter and ARTEMIS), and is planning a return to the lunar surface.

## For More Information

- [https://www.nasa.gov/mission\\_pages/apollo/missions/apollo11.html](https://www.nasa.gov/mission_pages/apollo/missions/apollo11.html)
- [https://www.lpi.usra.edu/lunar/missions/apollo/apollo\\_11/](https://www.lpi.usra.edu/lunar/missions/apollo/apollo_11/)