APOLLO

MOON LANDINGS

PHOTO

EVIDENCE

From

NASA's Lunar Reconnaissance Orbiter

Compiled by

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(2009)

(http://www.nasa.gov/mission_pages/LRO/multimedia/lroimages/apollosites.html)

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17 July 2009 - NASA's LRO Sees Apollo Landing Sites

NASA's Lunar Reconnaissance Orbiter, or LRO, has returned its first imagery of the Apollo moon landing sites. The pictures show the Apollo missions' lunar module descent stages sitting on the moon's surface, as long shadows from a low sun angle make the modules' locations evident.

The Lunar Reconnaissance Orbiter Camera, or LROC, was able to image five of the six Apollo sites, with the remaining Apollo 12 site expected to be photographed in the coming weeks.

The satellite reached lunar orbit June 23 and captured the Apollo sites between July 11 and 15. Though it had been expected that LRO would be able to resolve the remnants of the Apollo mission, these first images came before the spacecraft reached its final mapping orbit.

Future LROC images from these sites will have two to three times greater resolution.

All images credit: NASA/Goddard Space Flight Centre/Arizona State University

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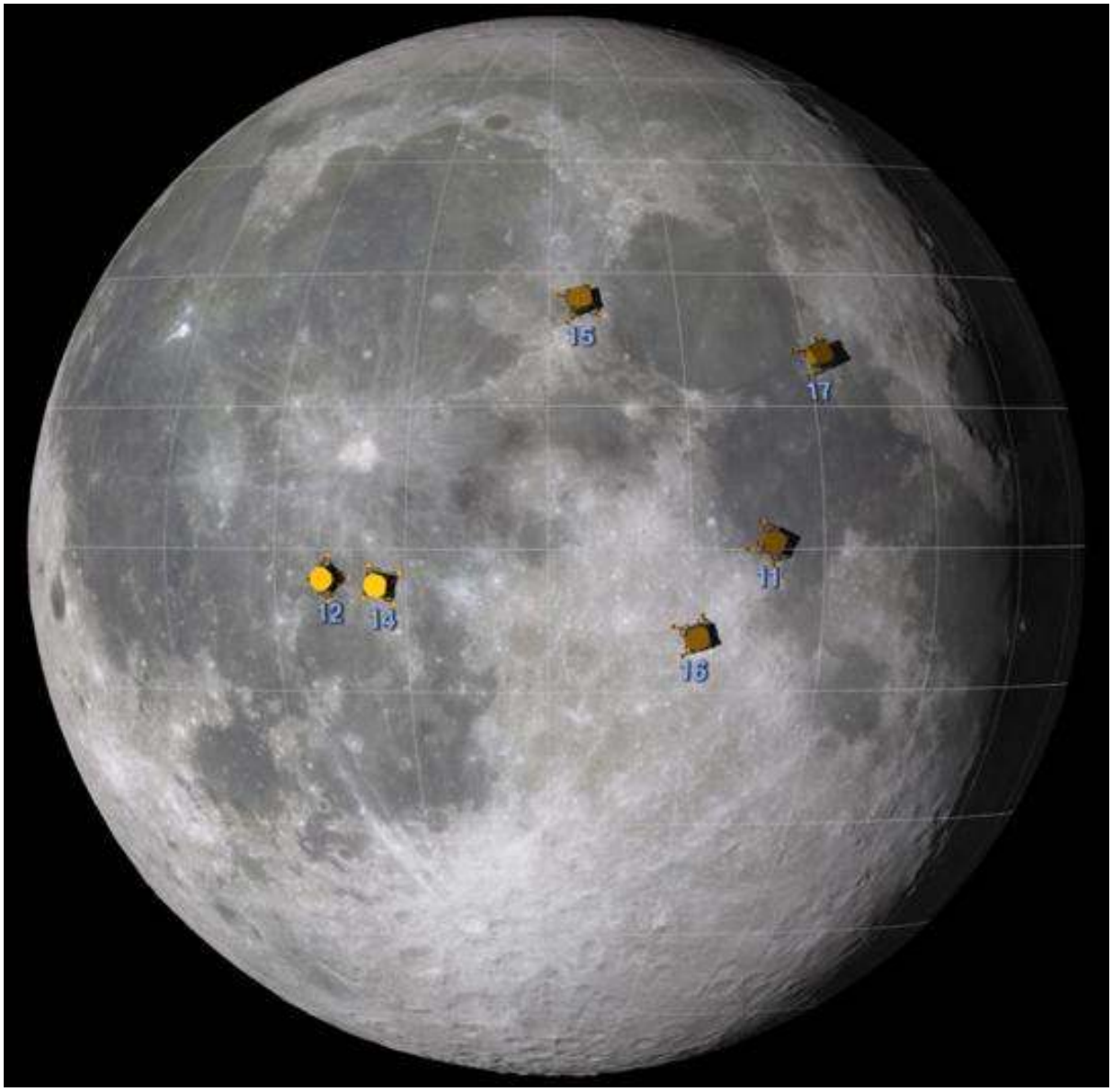
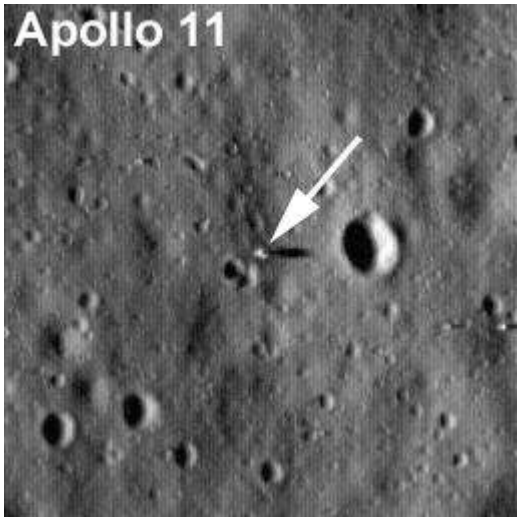
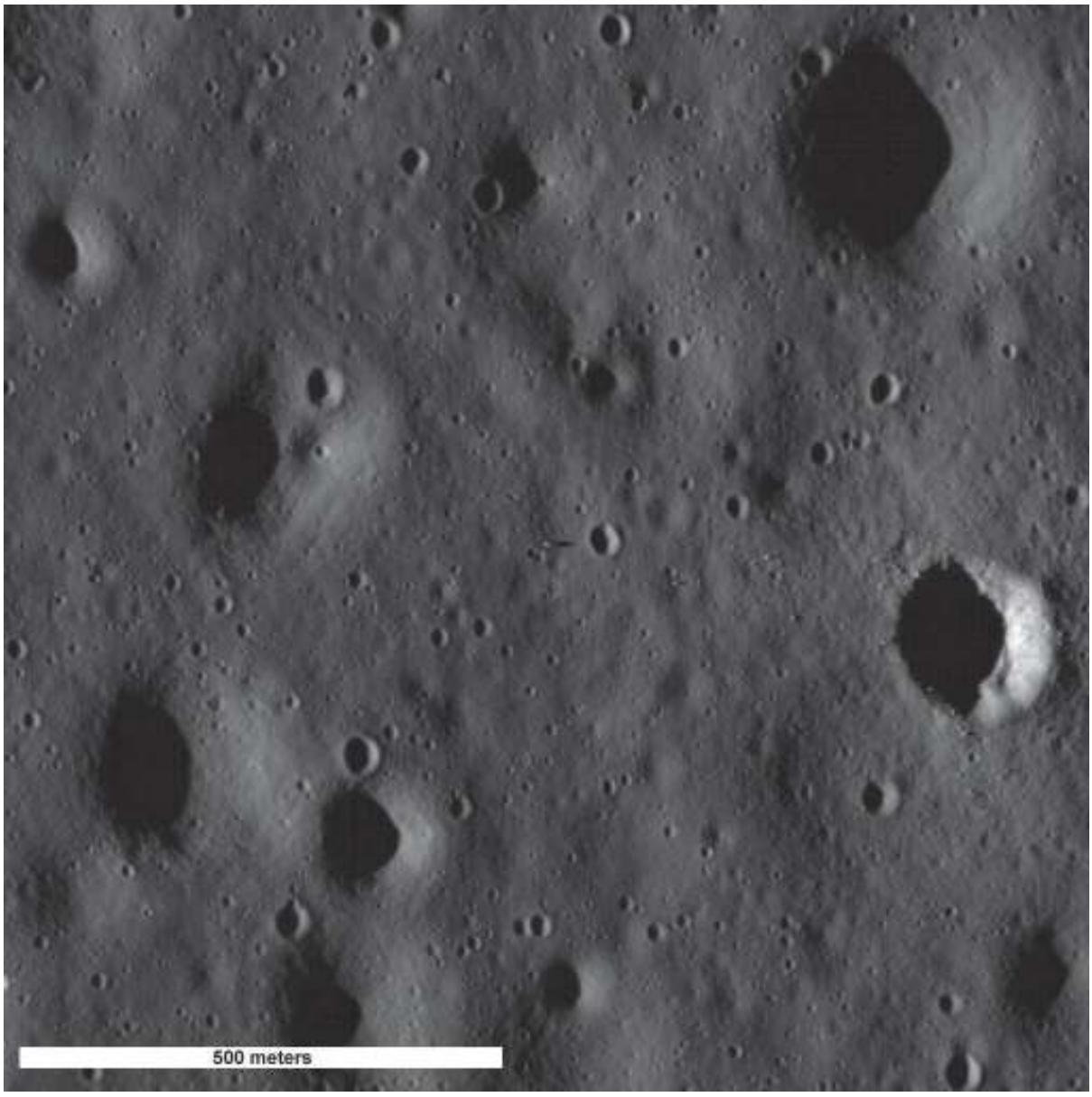
Apollo Landing Sites

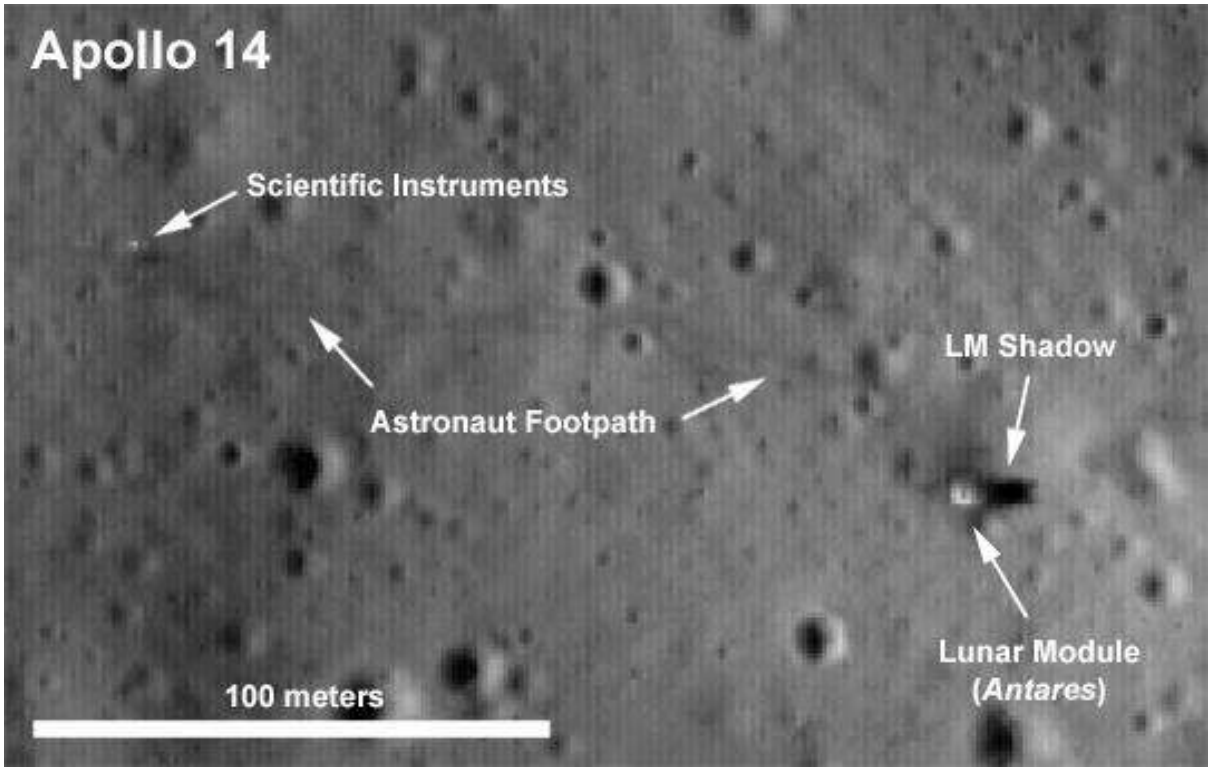


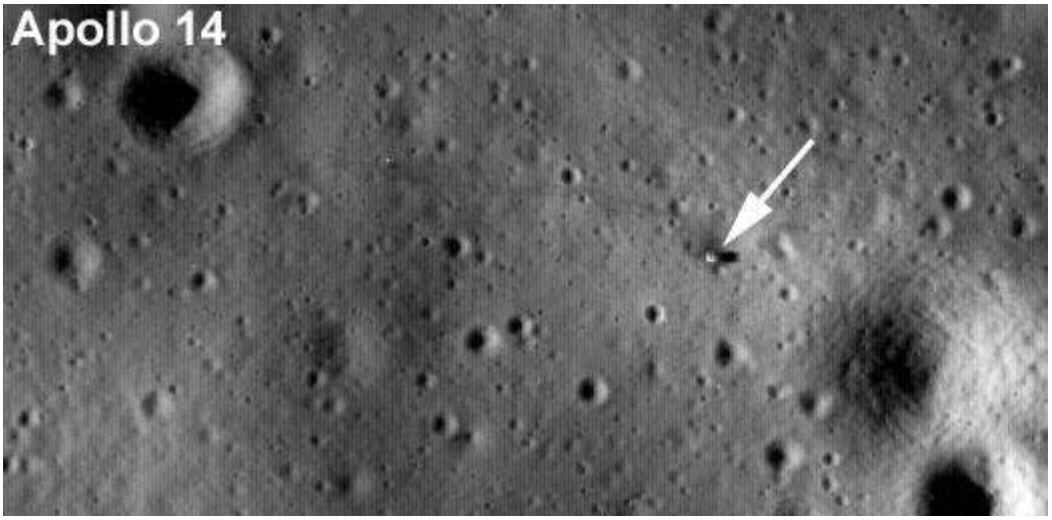
Apollo 11 Landing Site

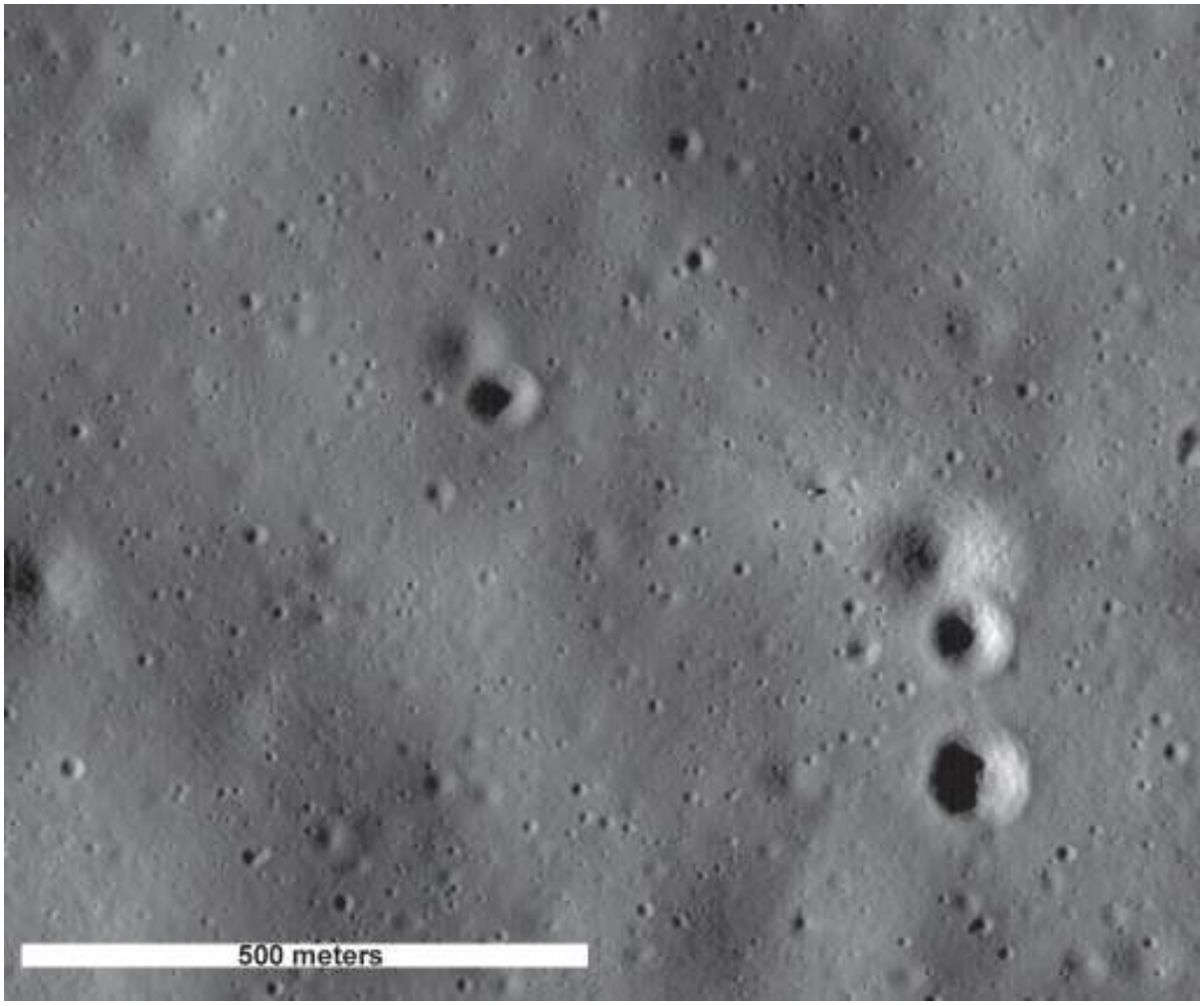




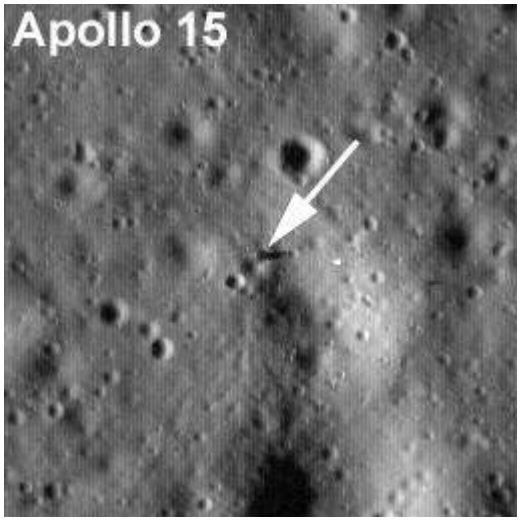
Apollo 14 Landing Site

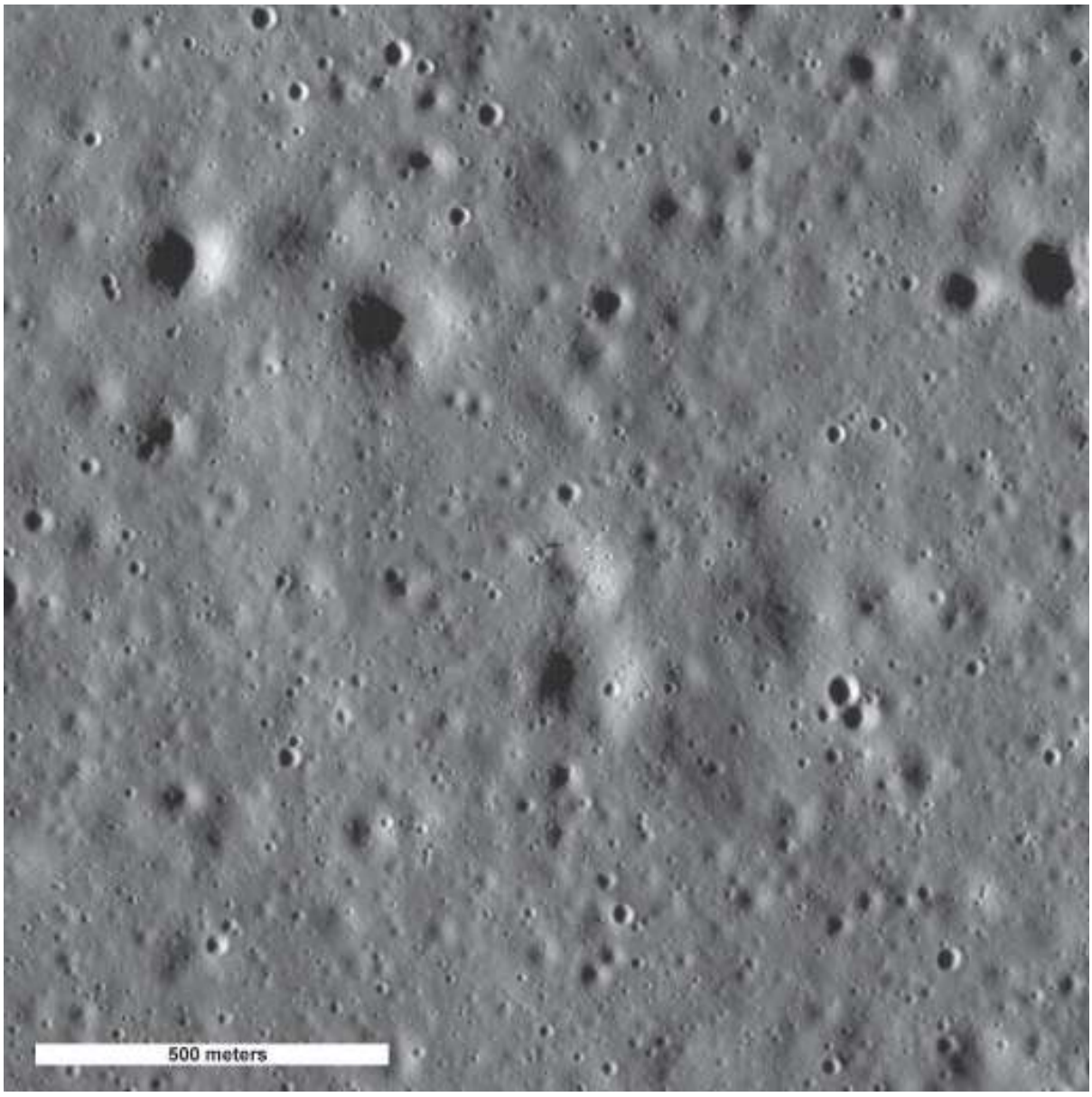




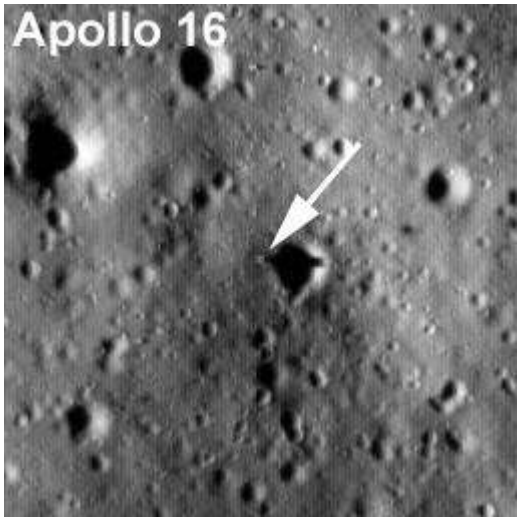

500 meters

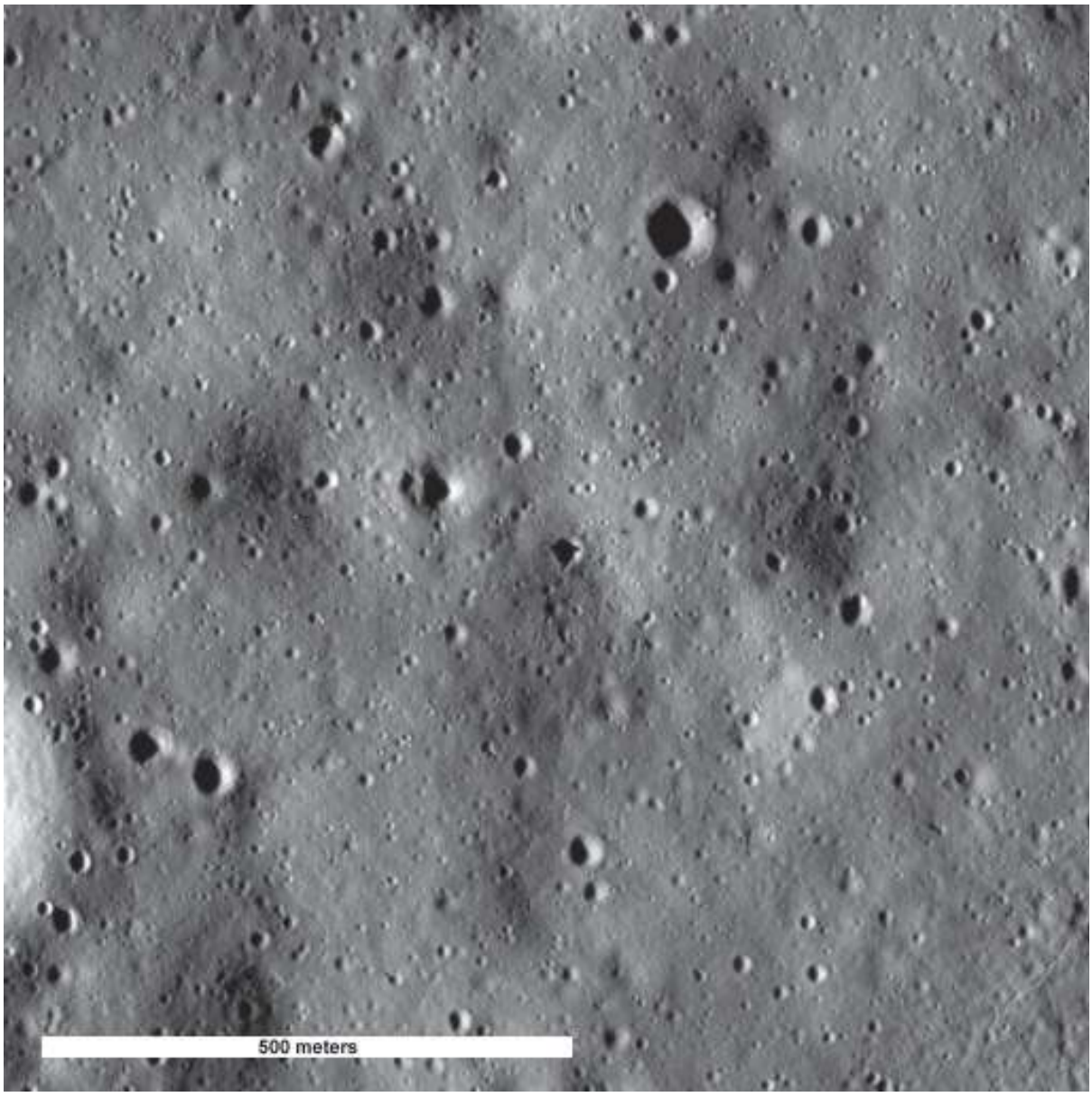
Apollo 15 Landing Site



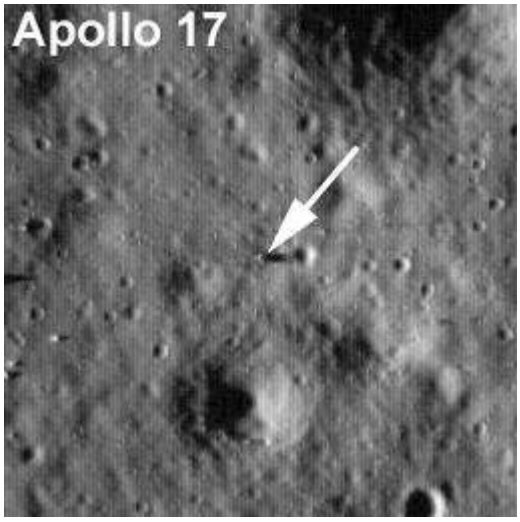


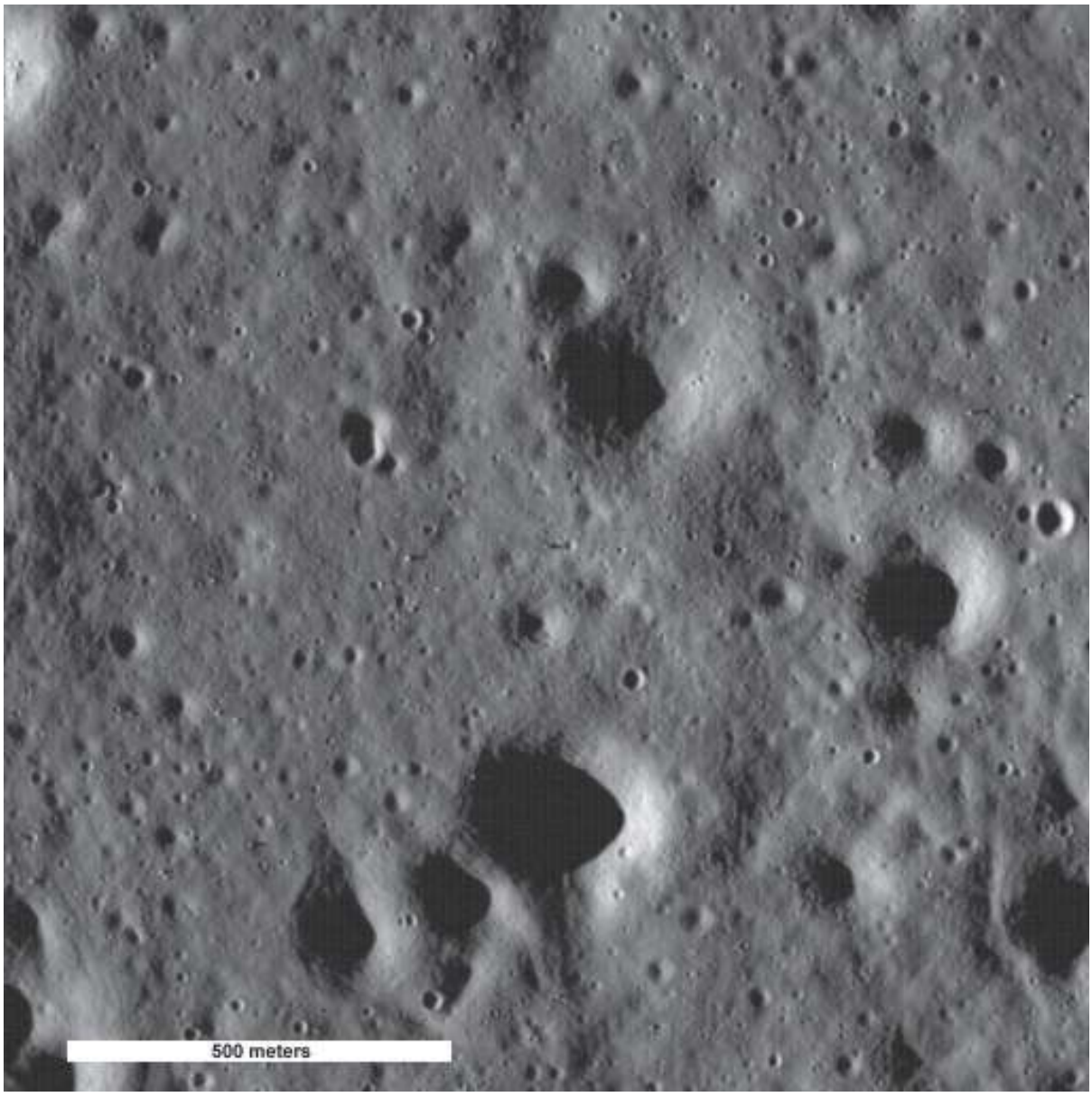
Apollo 16 Landing Site





Apollo 17 Landing Site





Accompaning Article

The following article accompanied the above photographs:

> *"The LROC team anxiously awaited each image," said LROC principal investigator Mark Robinson of Arizona State University. "We were very interested in getting our first peek at the lunar module descent stages just for the thrill -- and to see how well the cameras had come into focus. Indeed, the images are fantastic and so is the focus."*
>
> *"Not only do these images reveal the great accomplishments of Apollo, they also show us that lunar exploration continues," said LRO project scientist Richard Vondrak of NASA's Goddard Space Flight Center in Greenbelt, Md. "They demonstrate how LRO will be used to identify the best destinations for the next journeys to the moon."*
>
> *The spacecraft's current elliptical orbit resulted in image resolutions that were slightly different for each site but were all around four feet per pixel. Because the deck of the descent stage is about 12 feet in diameter, the Apollo relics themselves fill an area of about nine pixels. However, because the sun was low to the horizon when the images were made, even subtle variations in topography create long shadows. Standing slightly more than ten feet above the surface, each Apollo descent stage creates a distinct shadow that fills roughly 20 pixels.*
>
> *The image of the Apollo 14 landing site had a particularly desirable lighting condition that allowed visibility of additional details. The Apollo Lunar Surface Experiment Package, a set of scientific instruments placed by the astronauts at the landing site, is discernable, as are the faint trails between the module and instrument package left by the astronauts' footprints.*
>
> *Launched on June 18, LRO carries seven scientific instruments, all of which are currently undergoing calibration and testing prior to the spacecraft reaching its primary mission orbit. The LROC instrument comprises three cameras -- two high-resolution Narrow Angle Cameras and one lower resolution Wide Angle Camera. LRO will be directed into its primary mission orbit in August, a nearly-circular orbit about 31 miles above the lunar surface.*
>
> *Goddard built and manages LRO, a NASA mission with international participation from the Institute for Space Research in Moscow. Russia provided the neutron detector aboard the spacecraft.*
>
> (http://www.nasa.gov/mission_pages/LRO/multimedia/lroimages/apollosites.html)

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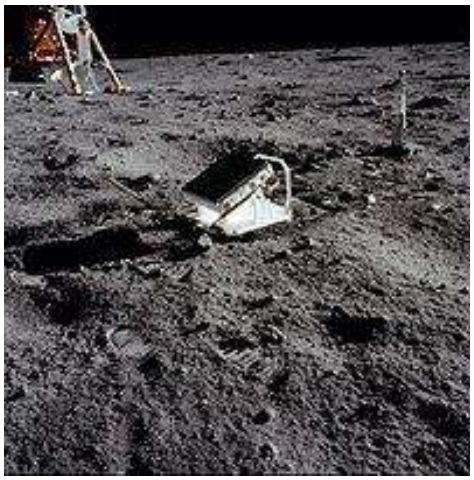
Appendix - Retro-reflectors on the Moon



Astronauts on the *Apollo 11*, *14*, and *15* missions set up and left retro-reflectors on the Moon as part of the Lunar Laser Ranging Experiment. They are considered to conclusively prove that man-made equipment is present on the moon and thus disprove some Moon landing hoax accusations.

Additionally the Soviet *Lunokhod 1* and *Lunokhod 2* rovers carried smaller arrays. Reflected signals were initially received from *Lunokhod 1*, but no return signals have been detected since 1971, at least in part due to some uncertainty of its location on the Moon. *Lunokhod 2's* array continues to return signals to Earth.

Even under good viewing conditions, only a single reflected photon is received every few seconds. This makes the job of filtering laser-generated photons from naturally-occurring photons challenging.

End

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