

Planetary Wonderings

July Focus: Did Man Really Walk on the Moon?

By Mary-Frances Bartels, NASA Solar System Ambassador

This month marks the 40th anniversary of the first moon landing by humans. The Apollo 11 mission was briefly recounted in the April *Planetary Wonderings* column and the lunar exploration talk I gave in March referenced in the same column. *PW* readers probably have no trouble believing that the United States sent men to the moon, men who actually walked on its surface. On the other hand, there are those that believe all moon missions were hoaxes. Let us briefly visit a few of their arguments as well as new discoveries that give compelling evidence that humans have, indeed, been to the moon.

One of the arguments against the landings is that photographs by the astronauts do not show stars in the sky. Though the sky on the moon is always black, similar to the Earth sky at night, the astronauts were on the moon during local morning — in the daytime. The sun made the landscape and the astronauts' suits very bright, necessitating using camera settings that could not capture the comparatively dim starlight. Had the astronauts optimized the cameras to view the stars, everything else would be totally washed out. Readers can easily see this with photo-enhancing software. Brightening a photo enough to bring out objects in a dark shadow causes a great loss in detail in bright objects.

Another argument involves the direction of shadows in the photographs. Logic would seem to dictate that all shadows from one light source would be parallel to each other. Lunar surface photographs do not show this, so, according to those who do not believe the moon landings really happened, they were faked. The problem with this is that it fails to take perspective into account. Whereas an overhead shot WOULD show parallel shadows, ground-based pictures show shadows from closer objects appearing to diverge from those of distant objects. This is a phenomenon that can be seen on Earth early in the morning or evening when there are long shadows and objects of differing distances from the observer.

Some unbelievers hone in on the moon rover videos. Examination of these same videos reveals dust disturbed by the tires falling in parabolic arcs as would be expected in an area of little to no atmosphere. Had the rovers been filmed on Earth, where there is air resistance, the dust would have billowed and taken longer to return to the ground, even in Earth's greater gravity. An example of this can be seen when a vehicle drives down a dirt road. There is a trail of dust behind said vehicle that lasts for minutes. No trail of dust is seen in any of the rover videos.

Probably the most recent evidence for humans landing on the moon comes not from NASA, but rather JAXA (Japan Aerospace eXploration Agency). JAXA's SELENE (Kaguya) mission provided convincing support for the Apollo 15 landing which occurred 38 years ago this month. Kaguya imaged the halo left by the Apollo lander exhaust as it left the lunar surface. Kaguya's 3-dimensional terrain camera was also used to produce very accurate topographic maps of the moon. Through the use of this data one may virtually "land on the moon" and "look around." Scientists took the data and virtually "imaged" the Apollo 15 landing site as it would appear from the surface. The computer simulation matched perfectly with a photograph taken by the Apollo 15 astronauts. The technology to imagine the surface of the moon in such detail did not exist in the 20th century.

Are there further plans to find evidence of humans going to the moon? Actually, there are. NASA's Lunar Reconnaissance Orbiter (discussed in Feb. and Nov. '08, and April '09 columns), launched last month, is set to image all the Apollo landing sites. It is expected that LRO's camera should be able to see Apollo 11's Eagle descent stage, as well as the lunar rover tracks from other Apollo missions.

Resource of the Month: Readers old enough to personally remember Apollo 11 are invited to reminisce about the mission with videos at YouTube. Other readers may experience the same excitement by watching coverage as it happened from the above-mentioned videos. A search reveals nearly 5000 hits at YT. Some moon hoax videos are on YT as well.

Activity of the Month: Do you play Second Life, the popular multi-user virtual world? If so, you might want to check out Astronomy 2009 Island. A consortium of governmental agencies, including NASA, museums, universities, private space-related groups, and others have created the SciLands, a mini-continent of science and nature themed islands within the game. The International Year of Astronomy group formed Astronomy 2009 Island. Various "activities" take place on this "island." Permanent "attractions" include a multi-media theater, a digital-style planetarium, a Dark Skies demonstration area, a Sidewalk Astronomy experience with a variety of small telescope models, and a unique implementation of the From Earth to the Universe astronomical imagery project. Astronomy 2009 Island recently welcomed monthly lectures from the Adler Planetarium in Chicago.

Suggestions, questions, corrections, and comments about "Planetary Wonderings" are welcomed and may be directed to stargazer @ keeplookingup.net (remove spaces). Past columns may be found at www.KeepLookingUp.net (click on "Planetary Wonderings" on the right side of opening screen) and at <http://www.freelists.org/archives/astronomyed/> (columns from Jan. 2007 to the present).

Remember to *keep looking up!*

Sources (not already mentioned in the article): <http://secondastronomy.org/>
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