Lunar Reconnaissance Orbiter releases new high-resolution earthrise image

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Credit: NASA/Goddard/Arizona State University

NASA's Lunar Reconnaissance Orbiter (LRO) recently captured a unique view of Earth from the spacecraft's vantage point in orbit around the moon.

"The image is simply stunning," said Noah Petro, Deputy Project Scientist for LRO at NASA's Goddard Space Flight Center in Greenbelt, Maryland. "The image of the Earth evokes the famous 'Blue Marble' image taken by Astronaut Harrison Schmitt during Apollo 17, 43 years ago, which also showed Africa prominently in the picture."

In this composite image we see Earth appear to rise over the lunar horizon from the viewpoint of the spacecraft, with the center of the Earth just off the coast of Liberia (at 4.04 degrees North, 12.44 degrees West). The large tan area in the upper right is the Sahara Desert, and just beyond is Saudi Arabia. The Atlantic and Pacific coasts of South America are visible to the left. On the moon, we get a glimpse of the crater Compton, which is located just beyond the eastern limb of the moon, on the lunar farside.

LRO was launched on June 18, 2009, and has collected a treasure trove of data with its seven powerful instruments, making an invaluable contribution to our knowledge about the moon. LRO experiences 12 earthrises every day; however the spacecraft is almost always busy imaging the lunar surface so only rarely does an opportunity arise such that its camera instrument can capture a view of Earth. Occasionally LRO points off into space to acquire observations of the extremely thin lunar atmosphere and perform instrument calibration measurements. During these movements sometimes Earth (and other planets) pass through the camera's field of view and dramatic images such as the one

shown here are acquired.

This image was composed from a series of images taken Oct. 12, when LRO was about 83 miles (134 kilometers) above the moon's farside crater Compton. Capturing an image of the Earth and moon with LRO's Lunar Reconnaissance Orbiter Camera (LROC) instrument is a complicated task. First the spacecraft must be rolled to the side (in this case 67 degrees), then the spacecraft slews with the direction of travel to maximize the width of the lunar horizon in LROC's Narrow Angle Camera image. All this takes place while LRO is traveling faster than 3,580 miles per hour (over 1,600 meters per second) relative to the lunar surface below the spacecraft!

The high-resolution Narrow Angle Camera (NAC) on LRO takes black-and-white images, while the lower resolution Wide Angle Camera (WAC) takes color images, so you might wonder how we got a high-resolution picture of the Earth in color. Since the spacecraft, Earth, and moon are all in motion, we had to do some special processing to create an image that represents the view of the Earth and moon at one particular time. The final Earth image contains both WAC and NAC information. WAC provides the color, and the NAC provides high-resolution detail.

"From the Earth, the daily moonrise and moonset are always inspiring moments," said Mark Robinson of Arizona State University in Tempe, principal investigator for LROC. "However, lunar astronauts will see something very different: viewed from the lunar surface, the Earth never rises or sets. Since the moon is tidally locked, Earth is always in the same spot above the horizon, varying only a small amount with the slight wobble of the moon. The Earth may not move across the 'sky', but the view is not static. Future astronauts will see the continents rotate in and out of view and the ever-changing pattern of clouds will always catch one's eye, at least on the nearside. The Earth is never visible from the

farside; imagine a sky with no Earth or moon - what will farside explorers think with no Earth overhead?"

NASA's first Earthrise image was taken with the Lunar Orbiter 1 spacecraft in 1966. Perhaps NASA's most iconic Earthrise photo was taken by the crew of the Apollo 8 mission as the spacecraft entered lunar orbit on Christmas Eve Dec. 24, 1968. That evening, the astronauts—Commander Frank Borman, Command Module Pilot Jim Lovell, and Lunar Module Pilot William Anders—held a live broadcast from lunar orbit, in which they showed pictures of the Earth and moon as seen from their spacecraft. Said Lovell, "The vast loneliness is awe-inspiring and it makes you realize just what you have back there on Earth."

Provided by NASA

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