

OUR MOON CROSSING OVER EARTH

A NASA camera aboard the Deep Space Climate Observatory (DSCOVR) satellite captured a unique view of the moon as it moved in front of the sunlit side of Earth last month. **The series of test images shows the fully illuminated "dark side" of the moon that is never visible from Earth.**

The images were captured by NASA's Earth Polychromatic Imaging Camera (EPIC), a four megapixel CCD camera and telescope on the DSCOVR satellite orbiting 1 million miles from Earth. From its position between the sun and Earth, DSCOVR conducts its primary mission of real-time solar wind monitoring for the National Oceanic and Atmospheric Administration (NOAA).

EPIC maintains a constant view of the fully illuminated Earth as it rotates, providing scientific observations of ozone, vegetation, cloud height and aerosols in the atmosphere. Once EPIC begins

regular observations next month, the camera will provide a series of Earth images allowing study of daily variations over the entire globe. About twice a

year the camera will capture the moon and Earth together as the orbit of DSCOVR crosses the orbital plane of the moon. These images were taken between 3:50 p.m. and 8:45 p.m. EDT on July 16, showing the moon moving over the Pacific Ocean near North America. The North Pole is in the upper left corner of the image, reflecting the orbital tilt of Earth from the vantage point of the spacecraft.



This image shows the far side of the moon, illuminated by the sun, as it crosses between the DSCOVR satellite and the Earth - one million miles away.

The far side of the moon was not seen until 1959 when the Soviet Luna 3 spacecraft returned the first images. Since then, several NASA missions have imaged the lunar far side in great detail. The same side of the moon always faces an earthbound observer because the moon is tidally locked to Earth. That means its orbital period is the same as its rotation around its axis.

In May 2008 NASA's Deep Impact spacecraft captured a similar view of Earth and the moon from a distance of 31 million miles away. The series of images showed the moon passing in front of our home planet when it was only partially illuminated by the sun.

EPIC's "natural colour" images of Earth are generated by combining three separate monochrome exposures taken by the camera in quick succession. EPIC takes a series of 10 images using different narrowband spectral filters -- from ultraviolet to near infrared -- to produce a variety of science products. The red, green and blue channel images are used in these colour images.

Combining three images taken about 30 seconds apart as the moon moves produces a slight but noticeable camera artifact on the right side of the moon. Because the moon has moved in relation to the Earth between the time the first (red) and last (green) exposures were made, a thin green offset appears on the right side of the moon when the three exposures are combined. This natural lunar movement also produces a slight red and blue offset on the left side of the moon in these unaltered images.

The lunar far side lacks the large, dark, basaltic plains, or maria, that are so prominent on the Earth-facing side. The largest far side features are Mare Moscoviense in the upper left and Tsiolkovskiy crater in the lower left. A thin sliver of shadowed area of moon is visible on its right side.

"It is surprising how much brighter Earth is than the moon," said **Adam Szabo**, DSCOVR project scientist at NASA's Goddard Space Flight Center in Greenbelt, Maryland. "Our planet is a truly brilliant object in dark space compared to the lunar surface."

Once EPIC begins regular observations next month, NASA will post daily color images of Earth to a dedicated public website. These images, showing different views of the planet as it rotates through the day, will be available 12 to 36 hours after they are acquired.

DSCOVR is a partnership between NASA, NOAA and the U.S. Air Force with the primary objective of maintaining the nation's real-time solar wind monitoring capabilities, which are critical to the accuracy and lead time of space weather alerts and forecasts from NOAA.

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