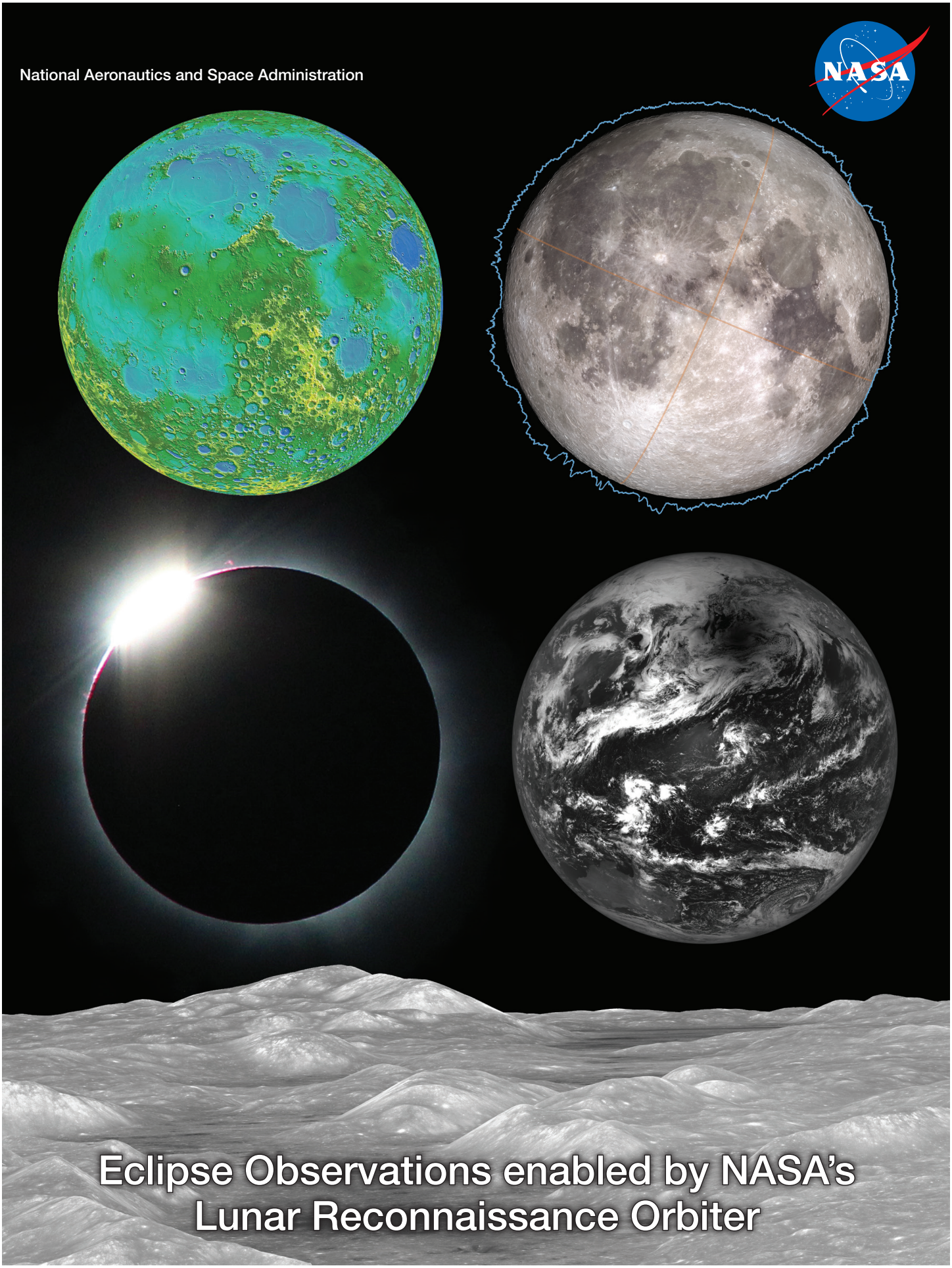
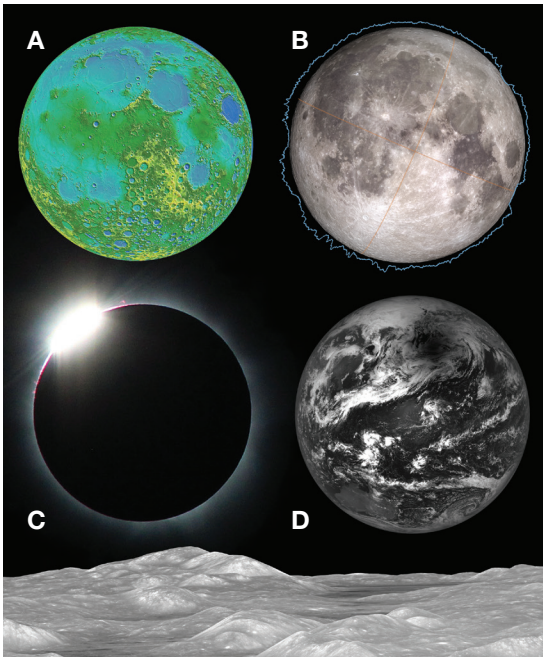
National Aeronautics and Space Administration



Eclipse Observations enabled by NASA's Lunar Reconnaissance Orbiter

Eclipse Observations enabled by NASA's Lunar Reconnaissance Orbiter

Data from NASA's Lunar Reconnaissance Orbiter (LRO) is revolutionizing our understanding of the Moon. With LRO, we have found evidence of recent lunar volcanism. Some lava may have erupted onto the Moon's surface only tens to hundreds of millions of years ago, instead of billions of years ago, as previously thought. We have found faults that indicate the entire Moon is shrinking! (Just a little bit, within the past few million years.) LRO has also witnessed changes on the Moon's surface (including lots of new impact craters) since the mission began in 2009. Every day, this spacecraft is helping us better understand our nearest celestial neighbor, and processes that are occurring throughout the Solar System. You can learn more about these discoveries on LRO's website, *www.nasa.gov/lro*.



[A: NASA/GSFC/LRO/LOLA; B: NASA/SVS, C: Rick Fienberg/TravelQuest/ International/Wilderness Travel; D and E: NASA/GSFC/ASU]

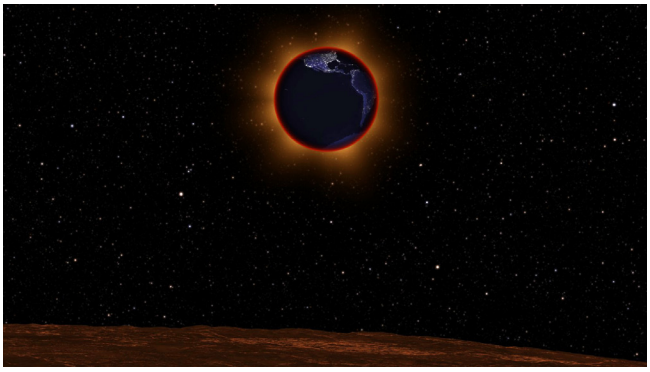
Thanks to LRO's onboard laser altimeter and high-resolution cameras we know the shape of the Moon better than any other object in the Solar System – including Earth (since the majority of the Earth's solid surface is under water). The top left image (**A**), shows the topography of the Moon, where cool colors represent low elevations and warm colors show areas with higher elevation. The blue line surrounding the Moon in the top right image (**B**) shows the outline of the Moon's topographic profile, exaggerated 20 times. The bottom image shows an oblique view of the Orientale basin: an example of the rough topography found on the Moon.

Solar Eclipses

When sunlight peeks through the low points in the jagged lunar limb during a total solar eclipse, we observers on Earth can see phenomena known as Baily's Beads and the diamond ring effect (**C**). At any given time and location, only a single, very small valley in the limb is needed to create the diamond, and that valley could occur at any point on the limb, not just obvious low points. Using LRO's topography data, we can predict the location and duration of these phenomena with better precision and accuracy than ever before. We can also more precisely predict the shape of the Moon's shadow on the Earth (**D**), and the rugged edges of the path the Moon's shadow will take as it moves across the Earth's surface.

Lunar Eclipses

To LRO, lunar eclipses are much more exciting! Lunar eclipses occur when the Sun, Earth, and Moon align and the shadow of the Earth falls on the Moon. LRO, in orbit around the Moon, also falls into Earth's shadow – and is cut off from its source of power: the Sun. LRO's operations team shuts down most of its instruments for the duration of the lunar eclipse to conserve energy. The exception to this is Diviner. This instrument can stay on to see how the Moon's uppermost surface responds to the rapid change in temperature during a lunar eclipse. The thermal properties of the surface help scientists better understand its composition and physical properties.



[NASA/SVS]

The image at right shows what a lunar eclipse looks like from the Moon. The Earth blocks the disc of the Sun. Sunlight filtering through Earth's atmosphere, the sum of all Earth's sunrises and sunsets, casts a reddish hue on the lunar landscape. In the darkness of the eclipse, stars become visible.

International Observe the Moon Night

Do you enjoy viewing the Moon? Participate in International Observe the Moon Night! One day each year, everyone on Earth is invited to observe and learn about the Moon, and to celebrate the cultural and personal connections we all have with Earth's nearest neighbor. To learn more about InOMN, the date for this year, find an event near you or resources to host your own, visit *observethemoonnight.org*.