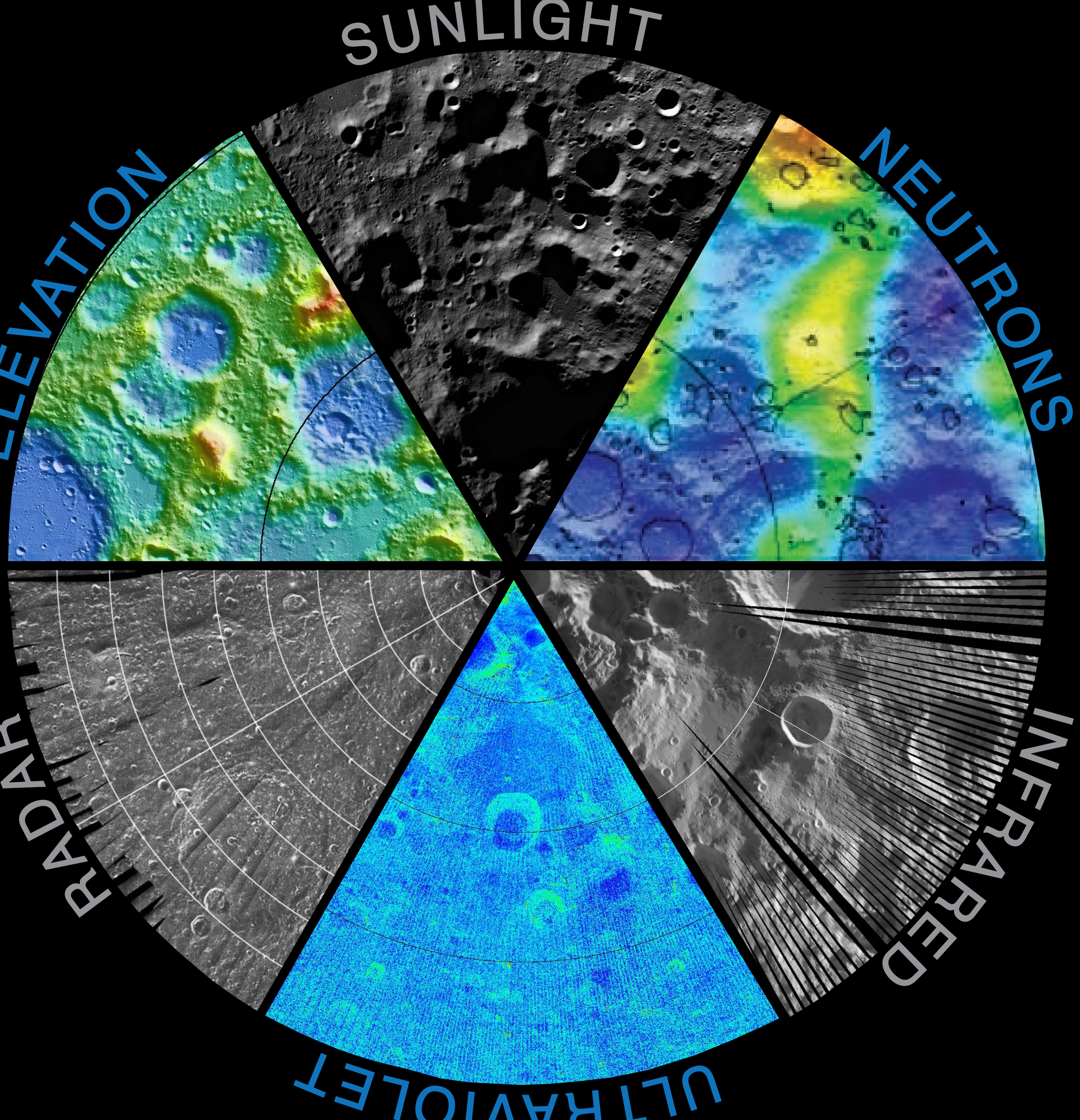
National Aeronautics and Space Administration



Views of the Lunar South Pole | Lunar Reconnaissance Orbiter

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LOLA

Polar craters have a mysterious landscape because their depths are often in shadow. The Lunar Orbiter Laser Altimeter (LOLA) dataset is revealing details of their topography for the first time. Crater slopes that are revealed are very steep, which would make traverses difficult and landslides commonplace. The LOLA measurements of shadowed polar crater slopes and their surface roughness take place at scales from lander size to kilometers. These measurements are helping the LRO science team model the physical characteristics of these craters to understand their origin and evolution.

Mini-RF

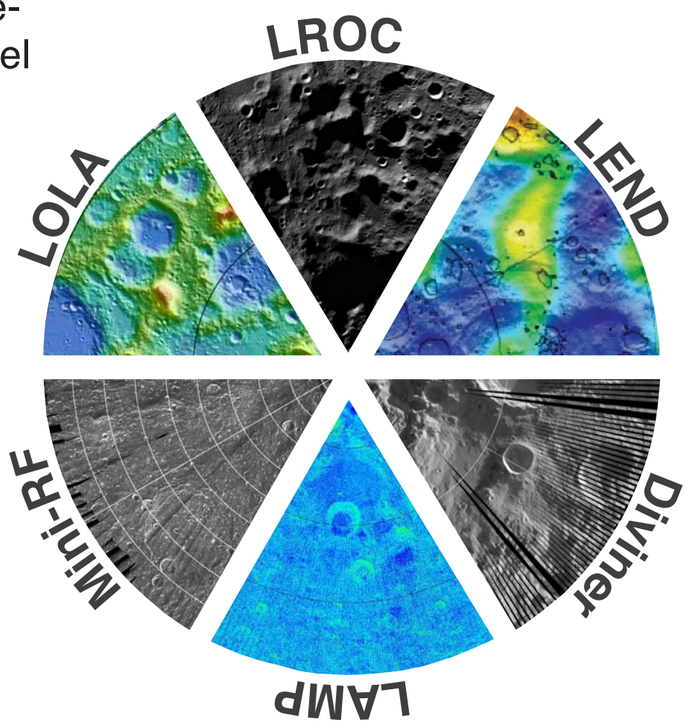
The Mini-RF instrument uses radar to explore the permanently shadowed regions inside polar impact craters. Mini-RF can look below the surface to hunt for buried ice deposits, which could be a resource for future human explorers. Additionally the radar data provides information on surface roughness, helping to identify safe landing sites and also to better understand the physics of impact craters.

CRaTER

The CRaTER (Cosmic Ray Telescope for the Effects of Radiation) instrument (data not shown) measures the ionizing radiation around the Moon due to Galactic Cosmic Rays and Solar Energetic Particle events. These measurements are used to estimate the effects that this radiation has on humans.

LROC

In a six-month (six lunar days) period, the Lunar Reconnaissance Orbiter Camera (LROC) Wide Angle Camera (WAC) collected 1,700 images of the South Pole covering the same area. These images were combined such that sunlight illumination conditions were maximized for each point in the field of view. The resulting image is one that displays the daytime view of the Moon's south pole at all latitudes.



LAMP

The Lyman Alpha Mapping Project (LAMP) uses a novel method to peer into the darkness of the Moon's permanently shadowed regions. The ultraviolet spectrograph observes the night side lunar surface using starlight and interplanetary sky glow as the light source. This Lyman-alpha glow is invisible to human eyes, but visible to LAMP as it reflects off the Moon. Analyses of the emissions, in collaboration with other LRO instruments, help determine lunar surface properties, including water content.

LEND

The Lunar Exploration Neutron Detector (LEND) instrument measures the flux of neutrons from the Moon, which are produced by the continuous cosmic ray bombardment of the lunar surface. The cosmic rays are sufficiently energetic to break apart atoms in the soil releasing neutrons that are then slowed down and absorbed by nuclei of elements in the soil. Not all the neutrons are captured by the soil, many escape, creating a leak-age flux of neutrons which the LEND instrument will observe. The distribution of neutron velocities, or measurements of how much they were slowed down before escaping, can tell us much about the lunar soil since it depends on the composition of the soil, and mostly, on the content of hydrogen, which may be in the form of water ice.

Diviner

This map reveals richly detailed thermal conditions throughout the south polar regions. Most notable are the measurements of extremely cold temperatures within the permanently shadowed regions of large polar impact craters in the south polar region. Diviner has recorded minimum daytime brightness temperatures in portions of these craters of less than 35K (-397° F) in the coldest areas. These super-cold brightness temperatures are among the lowest that have been measured anywhere in the solar system, including the surface of Pluto.

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