NASA details achievements of Lunar Reconnaissance Orbiter

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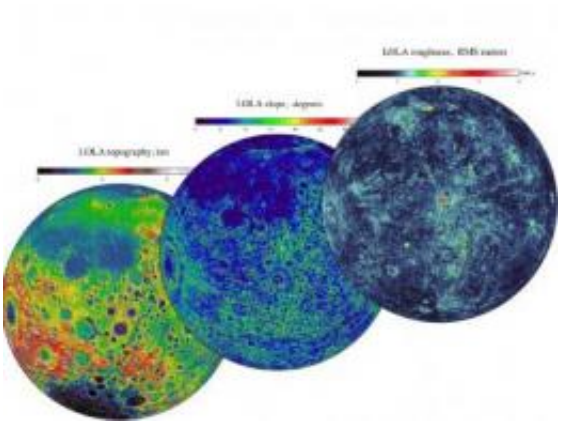

LOLA data give us three complementary views of the near side of the moon: the contours of the landscape, or topography (left), along with new maps of the surface slope values (middle) and the roughness of the topography (right). All three views are centered on the relatively young impact crater Tycho, with the Orientale basin on the left side. The slope magnitude indicates the steepness of terrain, while roughness indicates the presence of large blocks, both of which are important for surface operations. Credit: NASA/Goddard/Massachusetts Institute of Technology

NASA has declared full mission success for the Lunar Reconnaissance Orbiter (LRO). As a result of the mission, LRO has changed our view of the entire moon and brought it into sharper focus with unprecedented detail.

NASA's Exploration Systems Mission Directorate (ESMD) operated the

LRO spacecraft and its instruments during the one-year exploration mission. Now that the final data from the instruments have been added to the agency's Planetary Data System, the mission has completed the full success requirements. The data system, which is publicly available, archives data from past and present planetary missions as well as astronomical observations and laboratory data.

The rich new portrait rendered by LRO's seven instruments is the result of more than 192 terabytes of data, images and maps, the equivalent of nearly 41,000 typical DVDs.

"LRO is now in the very capable hands of NASA's Science Mission Directorate, with ongoing, near continuous acquisition of science data," said Douglas Cooke, associate administrator of ESMD at NASA Headquarters in Washington. "Exploration will be well served by the LRO science mission, just as the LRO exploration mission has benefited lunar science."

The primary objective of the mission was to enable safe and effective exploration of the moon. "We needed to leverage the very best the science community had to offer," said Michael Wargo, chief lunar scientist of ESMD. "And by doing that, we've fundamentally changed our scientific understanding of the moon."

The most precise and complete topographic maps to date of the moon's complex, heavily cratered landscape have been created from more than four billion measurements, which are still coming in, taken by LRO's Lunar Orbiter Laser Altimeter (LOLA). LOLA has taken more than 100 times more measurements than all previous lunar instruments of its kind combined, opening up a world of possibilities for future exploration and for science.

The Lunar Reconnaissance Orbiter Camera (LROC) revealed stunning

details after imaging nearly 5.7 million square kilometers of the moon's surface during the mission's exploration phase. That is roughly the same amount of land as all contiguous states west of the Mississippi River. Though earlier missions also imaged the moon, what sets LROC apart is its ability to image with surface pixels that are only 1.5 feet in size, small enough to distinguish details never before possible.

"With this resolution, LRO could easily spot a picnic table on the moon," said LRO's Project Scientist Richard Vondrak of NASA's Goddard Space Flight Center in Greenbelt, Md.

While studying the Hermite crater near the moon's north pole, LRO's Diviner Lunar Radiometer Experiment found the coldest recorded spot in the solar system, with a temperature of minus 415 degrees Fahrenheit (minus 248 degrees Celsius or 25 kelvins).

To further explore these regions, LRO's Lyman Alpha Mapping Project, which can "see" in the dark, is imaging the shaded areas, while LOLA's precise measurements map solar illumination. This work has provided new insight into the shadowed regions and also revealed areas that receive nearly continuous sun. Because sunlight itself is a resource on the moon, knowing there are areas that get sun for approximately 243 days a year and never have a period of total darkness for more than 24 hours is extremely valuable.

Complementing those efforts are both the Lunar Exploration Neutron Detector (LEND) and the Miniature Radio Frequency advanced radar, which are searching for deposits of water ice. LEND also seeks hydrogen, which could be used potentially as fuel. LRO's Cosmic Ray Telescope for the Effects of Radiation is studying the lunar radiation environment, which is important to keep astronauts healthy and safe.

LRO launched aboard an Atlas V rocket from Cape Canaveral, Fla., on

June 18, 2009.

More information: www.nasa.gov/LRO

Provided by NASA's Goddard Space Flight Center