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Feature

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**New Temperature Maps Provide a 'Whole New Way of Seeing the Moon'**

09.17.09

NASA's Lunar Reconnaissance Orbiter, an unmanned mission to comprehensively map the entire moon, has returned its first data. One of the instruments aboard, the Diviner Lunar Radiometer Experiment, is making the first global survey of the temperature of the lunar surface.

Diviner has obtained enough data already to characterize many aspects of the moon's current thermal environment. So far, the instrument has revealed richly detailed thermal behavior throughout the north and south polar regions that extends to the limit of Diviner's spatial resolution of just a few hundred yards.

"Most notable are the measurements of extremely cold temperatures within the permanently shadowed regions of large polar impact craters in the south polar region," said David Paige, UCLA professor of planetary science and principal investigator of the Diviner Lunar Radiometer Experiment. "Diviner has recorded minimum daytime brightness temperatures in portions of these craters of less than -238 degrees Celcius (-397 degrees Fahrenheit). These super-cold brightness temperatures are, to our knowledge, among the lowest that have been measured anywhere in the solar system, including the surface of Pluto."

"After decades of speculation, Diviner has given us the first confirmation that these strange, permanently dark and extremely cold places actually exist on our moon," said science team member Ashwin Vasavada from NASA's Jet Propulsion Laboratory in Pasadena, Calif. "Their presence greatly increases the likelihood that water or other compounds are frozen there. Diviner has lived up to its name."

The Diviner "commissioning phase" observations provide a snapshot in time of current polar temperatures that will evolve with the lunar seasons.

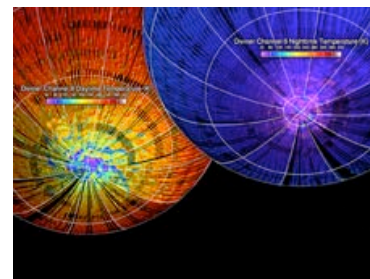
"It is safe to conclude that the temperatures in these super-cold regions are definitely low enough to cold-trap water ice, as well as other more volatile compounds for extended periods," Paige said. "The existence of such cold traps has been predicted theoretically for almost 50 years. Diviner is now providing detailed information regarding their spatial distribution and temperatures."

"Getting a look at the first global thermal maps of the lunar surface is a whole new way of seeing the moon," Paige said.

NASA's Lunar Reconnaissance Orbiter launched on June 18, 2009, carrying Diviner and six other instruments. Diviner has been mapping the moon continuously during the commissioning phase. Since the instrument was first activated on July 5, 2009, it has acquired more than 8 billion calibrated radiometric measurements and has mapped almost 50 percent of the surface area of the moon.

JPL designed, built and operates the Diviner instrument. NASA's Goddard Space Flight Center in Greenbelt, Md., built and manages the Lunar Reconnaissance Orbiter, a NASA mission with international participation from the Institute for Space Research in Moscow

For more information, visit the Diviner's web site at <http://diviner.ucla.edu> and the Lunar Reconnaissance Orbiter web site: <http://lunar.gsfc.nasa.gov/> .



Daytime and nighttime temperature observations of the lunar south pole recorded by the Diviner Radiometer Experiment, one of seven instruments on NASA's Lunar Reconnaissance Orbiter. Image credit: NASA/JPL/UCLA

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- On Oct 1, 2009 3:56 PM **Guest** wrote: -1

Aliens aren't impossible.
- On Sep 27, 2009 5:58 AM **Guest** wrote: +2

I believe that it's possible to have aliens or some living creatures on the other side of the moon according to the discovery of water molecules on the surface of the Moon.
- On Sep 26, 2009 2:44 PM **Sarah Hill** wrote: -1

I would really like to know so much about the moon I might use your information for every current event for my every science class.
- On Sep 26, 2009 12:26 PM **Filiberto Jimenez** wrote: +1

I am very interested to learn more about ou magnifiscent planet earth. I will give you a a never end thanks to allow the regular people to see and learn more about out planet. Thanks.
- On Sep 24, 2009 3:29 PM **william** wrote: -1

nice science: odds on liquid water anyone please?
- On Sep 21, 2009 3:38 PM **Guest** wrote: -2

...wow...
- On Sep 21, 2009 2:13 PM **Guest** wrote: -6

1. absolute zero is -273.16 Celsius, so how can the temperature be -280 ?  
 2. what mechanism could have cooled lunar surface below 3 degrees Kelvin (the cosmic background temperature) ?

**NASA Moderator:** It's possible you misread the temperatures quoted in the story. Here is what David Paige, UCLA professor of planetary science and principal investigator of the Diviner Lunar Radiometer Experiment, said: "Diviner has recorded minimum daytime brightness temperatures in portions of these craters of less than -238 degrees Celcius (-397 degrees Fahrenheit)."
- On Sep 20, 2009 5:08 PM **Wilber M Lima New York** wrote: -5

Post commence of lunar colonization, the use of weapons at that rate of gravity will ask you for laser use, maybe Star Wars movie was at least very hones.

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