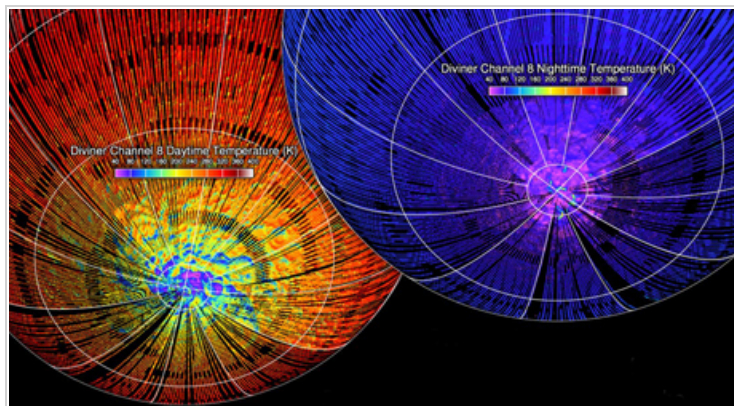


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NASA/JPL/UCLA  
Daytime and nighttime temperature observations of the lunar south pole recorded by the Diviner Radiometer Experiment.

## Evidence Suggests the Moon's Permanently Shadowed Craters Contain Ice

September 19, 2009 08:00 AM  
by Denis Cummings

The first results from the Lunar Reconnaissance Orbiter indicate that shadowed craters on the moon's north and south poles may be the coldest places in the solar system, raising the probability that water ice is present on the moon.

### Coldest Spots in Solar System May Hold Water Ice

NASA launched the Lunar Reconnaissance Orbiter (LRO) in June to [survey the moon for a future manned mission](#). Its objectives include measuring radiations and locating landing sites and potential resources for astronauts, specifically water.

NASA announced Thursday that preliminary results from the LRO [indicate that water ice might exist on the moon's two poles](#), which are permanently shadowed from the sun. The Diviner Lunar Radiometer Experiment found temperatures in craters at the poles as low as 397 degrees below zero, slightly colder than temperatures on Pluto and just 62 degrees higher than absolute zero.

"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 Ashwin Vasavada of NASA. "Their presence greatly increases the likelihood that water or other compounds are frozen there."

Results from the Lunar Exploration Neutron Detector, an instrument designed to detect hydrogen, [indicate that "hydrogen is not confined to permanently shadowed craters,"](#) says LRO scientist Richard Vondrak.

The presence of water on the moon [would greatly benefit a manned mission to the moon](#). "Water on the moon would reduce

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the need for hauling it from Earth to supply future colonists," writes John Johnson Jr. in the Los Angeles Times. "Water could also be used to produce oxygen for respiration and to make rocket fuel for a trip to Mars."

The LRO is still near the beginning of its one-year mission on the moon. It has thus far mapped nearly half of the moon's surface. It will continue taking measurements that should provide scientists with more definitive evidence of water ice.

### Background: Ice on the moon

Water ice, if it does exist on the moon, [does not last on the moon's surface for very long](#), explains NASA. Because the moon has no atmosphere and low gravity, water ice "will rapidly sublime directly into water vapor and escape into space." Therefore, when ice is exposed to sunlight and melts, it quickly disappears. "The only possible way for ice to exist on the Moon would be in a permanently shadowed area," says NASA.

- Sources in this Story
- [NASA: New Temperature Maps Provide a 'Whole New Way of Seeing the Moon'](#)
  - [MSNBC \(Space.com\): Tentative signs of water found on the moon](#)
  - [Los Angeles Times: NASA scientists find hydrogen in moon's sunlit regions](#)
  - [NASA: National Space Science Data Center: Ice on the Moon](#)
  - [NASA: Ames Research Center: Eureka! Ice found at lunar poles](#)
  - [USA Today: New images dampen hope for water ice on moon](#)

In March 1998, NASA's Lunar Prospector [detected evidence of between 10 to 300 million tons of water ice in thick sheets on the moon's poles](#). "We are certain that water is there. The uncertainty we have is how much," declared Alan Binder, principal investigator, for the mission.

[Subsequent research has put the Prospector's findings into doubt](#), as radar images have not been able to find evidence of water on the poles.

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