

naturenews

Published online 13 November 2009 | Nature | doi:10.1038/news.2009.1087

News

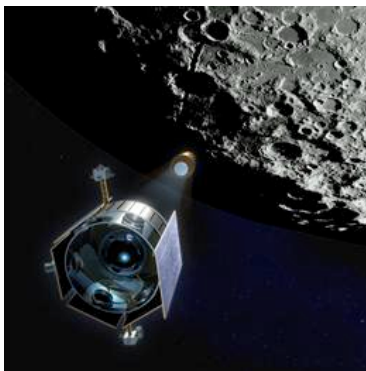
Lunar impact tosses up water and stranger stuff

NASA claims definitive detection of Moon water in the Solar System's 'attic'.

[Eric Hand](#)

The debate is finally over. Lunar scientists have detected water for certain near the north pole of the Moon, after the impact of a NASA projectile kicked up water vapour along with a plume of dust. But it's not just about the water, say the scientists, who found hints in the plume of other, more exotic molecules, ranging from organic hydrocarbons to mercury. Increasingly, the scientists are viewing the polar craters as the 'attics' of the Solar System, repositories for billions of years of history.

"It is the most definitive detection yet, and will certainly settle the question of this spot in Cabeus [crater] holding water," says Anthony Colaprete, of the Ames Research Center in Moffett Field, California, and principal investigator for Lunar Crater Observation and Sensing Satellite (LCROSS), an empty rocket stage that plunged into the Moon on 9 October. Colaprete announced the water discovery at a NASA press conference on Friday.



On the way to a wet landing.

N. GRUMMAN, W. FURLONG/NASA

Although the water finding is important, he is most interested in learning more about the strange stuff that still might be buried in darkness. Because the Moon has nearly no tilt to the Sun, some of its craters, including parts of Cabeus, remain in permanent shadows that get as cold as Pluto. The cold and lack of light turn them into vaults for all that falls within their rims. "These cold traps — they've swept through the inner solar system over the past couple billion years and have accumulated everything that has migrated to them."

The material remains locked in the traps, except when impacts such as LCROSS stir up the pot. Although the impact blast wasn't as spectacular as had been anticipated (see ['Moon Smash Gives off Flash'](#)), Colaprete says his team gleaned rich data from LCROSS's trailing satellite, on a suicide trajectory four minutes behind. The impact carved out a crater more than 20 metres wide and sent dust tens of kilometres above the surface, beyond the crater walls and into sunlight.

Using spectroscopy in both the infrared and ultraviolet, Colaprete's team looked for telltale spectral lines caused by water. In the infrared, they found some lines at frequencies where light was absorbed by water molecules. In the UV, they found emission lines, where energy absorbed by water molecules was re-radiated as faint light. Colaprete says the signature is unique, and strong — he is confident that water accounts for more than 1% of the weight of the debris cloud from the impact.

The final frontier

And that's enough to pique the interest of those who seek to colonize the Moon. LCROSS, along with its sister mission the Lunar Reconnaissance Orbiter (LRO), was launched on 18 June — and paid for by the division of NASA that manages human space exploration, not science.

The spectra also showed evidence of hydrocarbons, which could have reached the moon along with the water during impacts from organic-rich comets. Another process, a continuous stream of

protons from the solar wind, could also implant small amounts of water in the soil (see ['Water on the Moon?'](#)).

One of the most unexpected compounds — mercury — was detected by an instrument on LRO, which normally looks for the faint ultraviolet glow of the universe reflecting off of material in the permanently shadowed craters. In this case, it peered into the post-impact haze of LCROSS. Randy Gladstone, acting principal investigator for that instrument, called LAMP (for Lyman-Alpha Mapping Project), says there is a spectral signature that can only be fit well by mercury. With that element present at a sizeable fraction of a percent, Gladstone says he's not sure if he would really want to drink the Moon's water. But he hopes that the find will at least encourage future missions to the poles to figure out when and how it got there. "The soil there is this tape recorder for everything that's happened in last billion years or so on the Moon."

ADVERTISEMENT

nature
chemistry

Publishing cutting edge research
in all areas of chemistry

CALL FOR PAPERS

Comments

Reader comments are usually moderated after posting. If you find something offensive or inappropriate, you can speed this process by clicking 'Report this comment' (or, if that doesn't work for you, email webadmin@nature.com). For more controversial topics, we reserve the right to moderate before comments are published.

There are currently no comments.

Add your own comment

You can be as critical or controversial as you like, but please don't get personal or offensive, and do keep it brief. Remember this is for feedback and discussion - not for publishing papers, press releases or advertisements, for example. If you ramble on in an annoying way too often, we may remove your posting privileges.

You need to be registered with Nature to leave a comment. Please log in or register as a new user. You will be re-directed back to this page.

[Log in / register](#)

Nature ISSN 0028-0836 EISSN 1476-4687

[About NPG](#)
[Contact NPG](#)
[RSS web feeds](#)
[Help](#)

[Privacy policy](#)
[Legal notice](#)
[Accessibility statement](#)

[Nature News](#)
[Naturejobs](#)
[Nature Asia](#)
[Nature Education](#)

[About Nature News](#)
[Nature News Sitemap](#)

Search:

© 2009 Nature Publishing Group, a division of Macmillan Publishers Limited. All Rights Reserved.

partner of AGORA, HINARI, OARE, INASP, CrossRef and COUNTER