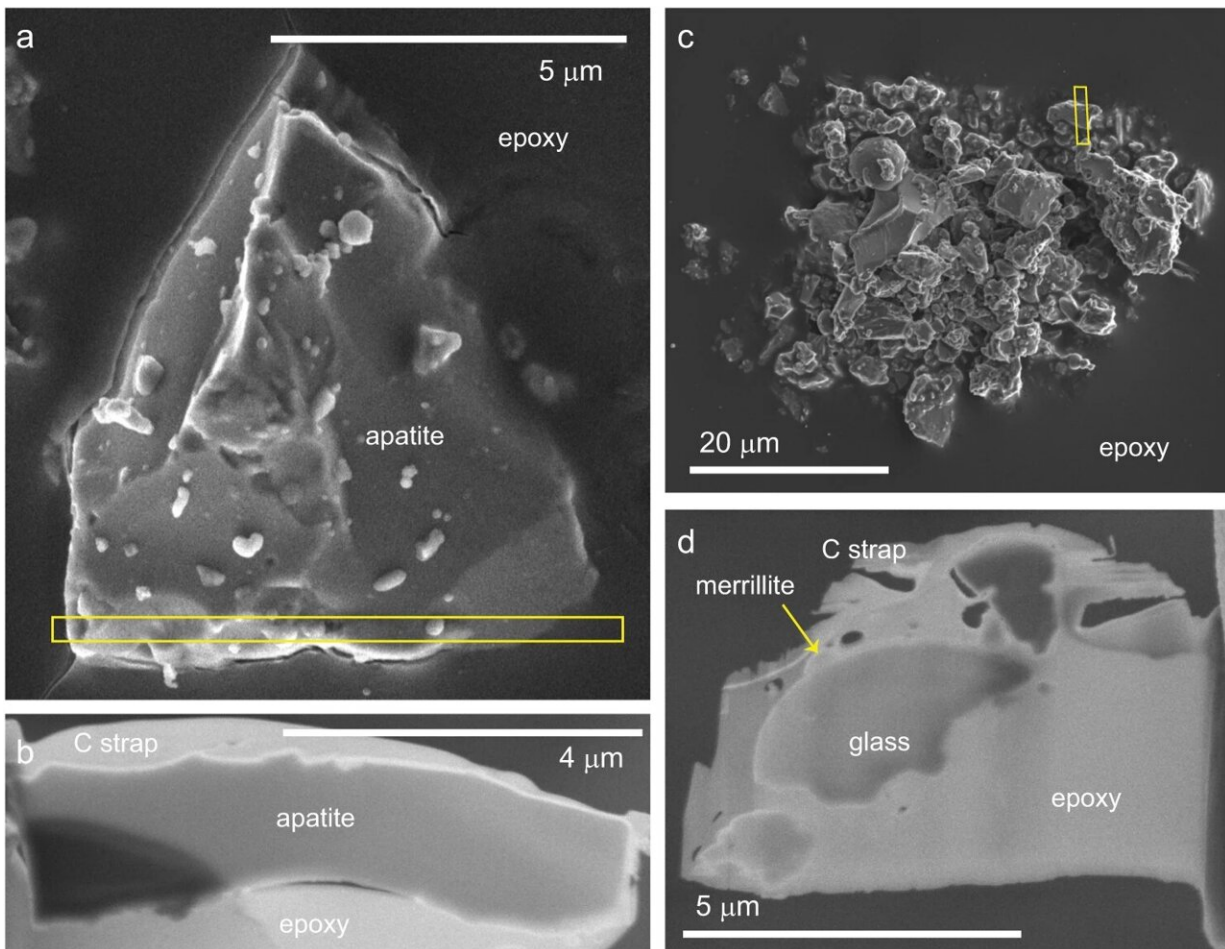


Hydrogen detected in lunar samples, points to resource availability for space exploration

November 21 2023, by Susan Guth



Lunar samples analyzed in this study. **a** SEM image of apatite particle mounted in epoxy. The sample surface has a number of adhered grains and apparent melt splashes. **b** SEM image of thinned FIB section extracted from location of yellow box in **(a)** showing multiple surfaces of grain available for study of space weathering features. **c** SEM image of dirt pile showing location of extracted

slice. **d** SEM image of FIB section that includes a merrillite grain along with several other soil particles. Credit: *Communications Earth & Environment* (2023). DOI: 10.1038/s43247-023-01060-5

U.S. Naval Research Laboratory (NRL) researchers have discovered solar-wind hydrogen in lunar samples, which indicates that water on the surface of the moon may provide a vital resource for future lunar bases and longer-range space exploration. Space-based resource identification is a key factor in planning for civilian- and government-led space exploration.

"Hydrogen has the potential to be a resource that can be used directly on the lunar surface when there are more regular or permanent installations there," said Dr. Katherine D. Burgess, geologist in NRL's Materials Science and Technology Division. "Locating resources and understanding how to collect them prior to getting to the moon is going to be incredibly valuable for space exploration."

The Apollo lunar soil samples were provided by a NASA research mission to NRL scientists for investigation and testing. The research team, led by scientists in NRL's Materials Science and Technology Division, continues to study [lunar surface](#) and asteroidal samples to gain an understanding of how surfaces interact with the space environment, which is known as space weathering. Previous testing from additional Apollo samples confirmed the location of solar wind helium in lunar soil grains.

"This is the first time scientists have demonstrated the detection of hydrogen-bearing species within vesicles in lunar samples," said Dr. Burgess. "Previously, the same team at NRL used state-of-the-art techniques such as scanning [transmission electron microscopy](#) and

[electron energy loss spectroscopy](#) to detect helium in lunar samples, and other researchers have found water in other planetary samples, but this is the first publication to show hydrogen in-situ in [lunar samples](#)."

The research is [published](#) in the *Communications Earth & Environment* journal.

More information: Katherine D. Burgess et al, Hydrogen-bearing vesicles in space weathered lunar calcium-phosphates, *Communications Earth & Environment* (2023). [DOI: 10.1038/s43247-023-01060-5](https://doi.org/10.1038/s43247-023-01060-5)

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