

Possible lunar lava tube could shelter moon explorers

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Muenster, Germany - A lunar lava tube could someday serve as a shelter for moon explorers. A team of researchers including Germany's Harald Hiesinger, a professor at Muenster University's Institute of Planetology, have discovered what they believe is a lava tube "skylight" in high-resolution pictures taken by the Japanese lunar orbiter SELENE. Also known by its Japanese nickname Kaguya, SELENE (SELEnological and ENgineering Explorer) was launched in September 2007 and was intentionally crashed onto the lunar surface last June.

"Lunar lava tubes are a potentially important location for a future lunar base, whether for local exploration and development, or as an outpost to serve exploration beyond the moon," wrote the team, led by Junichi Haruyama, a senior researcher with the Japan Aerospace Exploration Agency (JAXA). Their findings were published in the US scientific journal Geophysical Research Letters.

There are also lava tubes on Earth. They form when molten rock flowing from a volcanic eruption cools and hardens on top while the lava underneath continues to flow. If the lava drains completely, a cavern is left. Scientists have long suspected that such rock formations exist on the moon but lacked evidence until now.

Moon explorers would need shelter from extreme fluctuations in temperature of up to 300 degrees centigrade, meteorite impacts and dangerous radiation. Since the moon lacks an atmosphere, it is struck by unfiltered ultraviolet light from the sun.

"The moon isn't anyplace you'd like to spend a lot of time," remarked Hiesinger, one of two researchers on Haruyama's team from Muenster University. He is nevertheless convinced that humans will settle there in the long term. If and when they do, lava tubes could provide safe lunar stations.


Since no-one has seen the suspected lunar lava tube at close range, many questions remain. Assuming it is indeed a lava tube, what does it look like inside? Is there ice? Is it cold?

The lack of air to breathe on the moon means that lunar explorers would first have to set up a habitat module -- perhaps inflatable -- with an artificial atmosphere in the lava tube. Such a module, Hiesinger said, is definitely feasible and could shelter humans as well as research equipment.


Data from SELENE's cameras showed that the hole leading into the suspected lunar lava tube, located in a volcanic region called Marius Hills in the western part of the moon's nearside -- the hemisphere permanently facing the Earth -- is 65 metres in diameter and at least 80 metres deep.

According to Haruyama's research team, the hole's depth and diameter ratio are much larger than that of craters typically caused by meteorite impacts. Other conceivable causes are a lunar earthquake or an effect of the Earth's gravitational forces.

The researchers hope to get sharper pictures of the hole from the Lunar Reconnaissance Orbiter (LRO), which was launched by the US space agency NASA in June 2009. Among the LRO's tasks is to locate potential sources of water on the moon for future manned missions.



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