

Evidence for ocean on Enceladus: Tiny Saturn Moon Could Be Targeted in Search for Extraterrestrial Life

July 22 2009, By Lori Stiles



Cassini imaging scientists used views like this one to help them identify the source locations for individual jets spurting ice particles, water vapor and trace organic compounds from the surface of Saturn's moon Enceladus. This false-color view was created by combining three clear filter images taken at nearly the same time. (NASA/JPL/Space Science Institute)

(PhysOrg.com) -- Plumes spewing from a tiny moon of Saturn - a moon roughly the width of Arizona - are filled with molecules that suggest that the moon, Enceladus, is likely another place in the solar system to look for life, Cassini scientist Jonathan Lunine of The University of Arizona Lunar and Planetary Laboratory said.

When NASA's [Cassini spacecraft](#) flew through a plume erupting from Enceladus early last October, its Ion and Neutral [Mass Spectrometer](#) instrument measured ammonia, [argon](#) 40 and an abundance of carbon-bearing molecules, or "organics," entrained in the [water vapor](#).

Lunine is on the team reporting the results in the July 23 issue of the journal *Nature*.

Cassini discovered water vapor and particles spewing from Enceladus in a previous, more distant flyby in 2005. Since then, scientists have been trying to determine if the source of the jets is liquid.

"The fact that there's ammonia on Enceladus is important because it argues the plumes are erupting from a region of liquid water beneath the surface of Enceladus, rather than erupting from what is just warm ice," Lunine said.

Ammonia acts as antifreeze. Water containing ammonia remains liquid at temperatures as low as minus 143 degrees Fahrenheit.

Cassini has measured temperatures higher than minus 136 degrees Fahrenheit near the fractures where Enceladus shoots out its water vapor plumes, so "We think we have an excellent argument for a liquid water interior," said Hunter Waite of the Southwest Research Institute in San Antonio, Texas, lead scientist for Cassini's Ion and Neutral Mass Spectrometer experiment.

Argon 40, an isotope of argon, which is a decay product of potassium, also strengthens the argument for a liquid water source, Lunine said. Rocks on Earth and elsewhere, including Saturn's giant [moon Titan](#), give off argon 40.

"The fact that we found a lot of argon 40 also argues for liquid water,"

Lunine said. [Liquid water](#) most likely circulating through Enceladus' rocky core is the best explanation for all the argon 40 detected, he said.

The Cassini team also discovered such carbon-bearing molecules as methane, formaldehyde, ethanol and hydrocarbons are plentiful in the plumes.

Given other recently reported Cassini evidence for sodium and potassium in Saturn's E ring - a ring made of material that comes from Enceladus, there must be a salty, liquid layer in Enceladus that "seems like a pretty good environment for life," Lunine said.

"What I think is really interesting now is that we have four places in the outer solar system with interior oceans," he said.

Scientists have evidence that Saturn's Titan and Jupiter's moons Europa and Ganymede also have oceans.

Mars, Titan, Europa and now [Enceladus](#) seem to be good sites to search for extraterrestrial life, Lunine added.

Provided by University of Arizona ([news](#) : [web](#))

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