

## Radical! Liquid Water on Enceladus

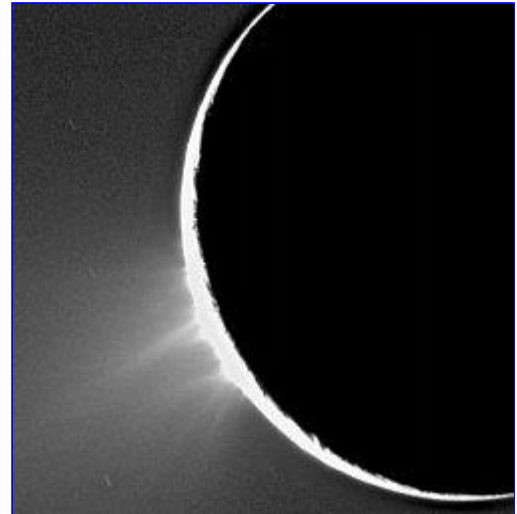
03.09.2006

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**March 9, 2006:** NASA's Cassini spacecraft may have found evidence of liquid water reservoirs that erupt in Yellowstone-like geysers on Saturn's moon Enceladus. The rare occurrence of liquid water so near the surface raises many new questions about this mysterious moon.

"We realize that this is a radical conclusion -- that we may have evidence for liquid water within a body so small and so cold," said Carolyn Porco, Cassini imaging team leader at the Space Science Institute, Boulder, Colo. "However, if we are right, we have significantly broadened the diversity of solar system environments where we might possibly have conditions suitable for living organisms."

**Right:** Icy fountains shoot out of Saturn's moon Enceladus. [[More](#)]



High-resolution Cassini images show icy jets and towering plumes ejecting huge quantities of particles at high speed. Scientists examined several models to explain the process. They ruled out the idea the particles are produced or blown off the moon's surface by vapor created when warm water ice converts to a gas. Instead, scientists have found evidence for a much more exciting possibility. The jets might be erupting from near-surface pockets of liquid water above 0 degrees Celsius (32 degrees Fahrenheit), like cold versions of the Old Faithful geyser in Yellowstone: [illustration](#).

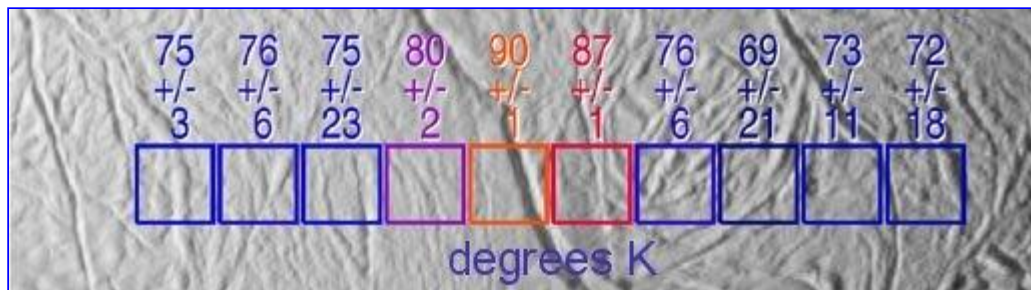
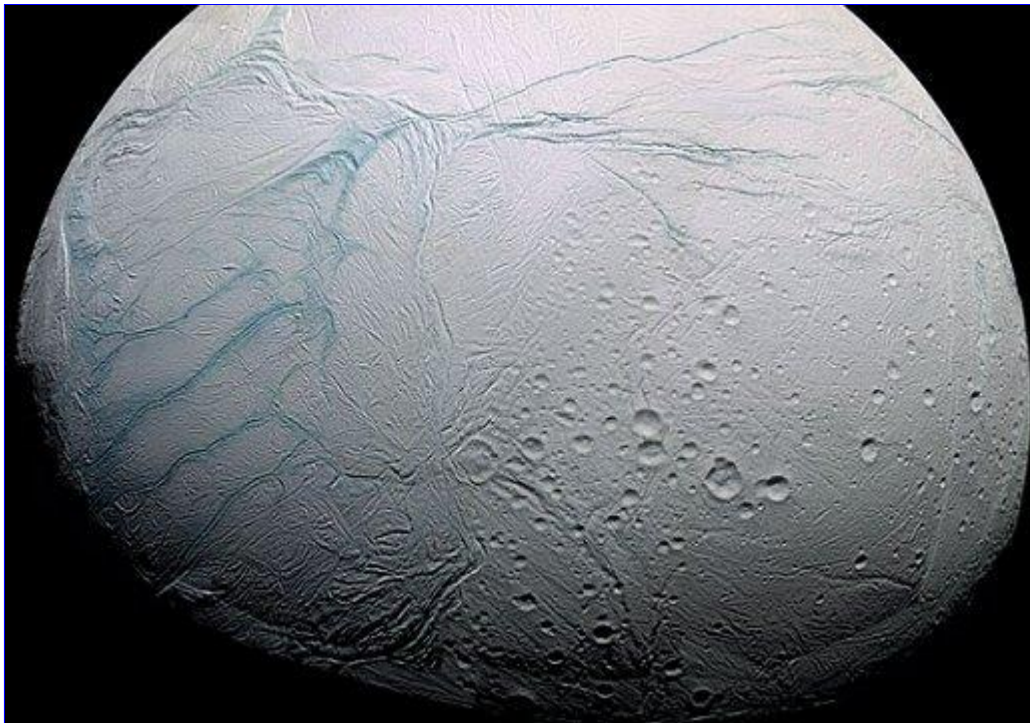
"We previously knew of at most three places where active volcanism exists: Jupiter's moon Io, Earth, and possibly Neptune's moon Triton. Cassini changed all that, making Enceladus the latest member of this very exclusive club, and one of the most exciting places in the solar system," said John Spencer, Cassini scientist, Southwest Research Institute, Boulder.

"Other moons in the solar system [may] have liquid-water oceans covered by kilometers of icy crust," said Andrew Ingersoll, imaging team member and atmospheric scientist at the California Institute of Technology, Pasadena, Calif. "What's different here is that pockets of liquid water may be no more than tens of meters below the surface."

"As Cassini approached Saturn, we discovered the Saturnian system is filled with oxygen atoms. At the time we had no idea where the oxygen was coming from," said Candy Hansen, Cassini scientist at NASA's Jet Propulsion Laboratory (JPL) in Pasadena. "Now we know Enceladus is spewing out water molecules, which break down into oxygen and hydrogen."

**Below:** A Cassini image of Enceladus. The blue-green "tiger stripes" are thought to be the source of Enceladus's water jets. [[More](#)]





**Above:** Cassini's infrared spectrometer took the temperature of a tiger stripe. The fissure is at least 15 degrees K warmer than its surroundings--a sign of geothermal activity. [[More](#)]

Scientists still have many questions. Why is Enceladus so active? Might this activity have been continuous enough over the moon's history for life to have had a chance to take hold in the moon's interior? In the spring of 2008, scientists will get another chance to look at the geysers--and another crack at answering these questions--when Cassini flies within 350 kilometers (approximately 220 miles) of Enceladus.

"There's no question, along with the moon Titan, Enceladus should be a very high priority for us," said Jonathan Lunine, Cassini interdisciplinary scientist, University of Arizona, Tucson, Ariz. "Saturn has given us two exciting worlds to explore."

Mission scientists report these and other Enceladus findings in this week's issue of *Science*.