Cassini sees Saturn stressing out Enceladus

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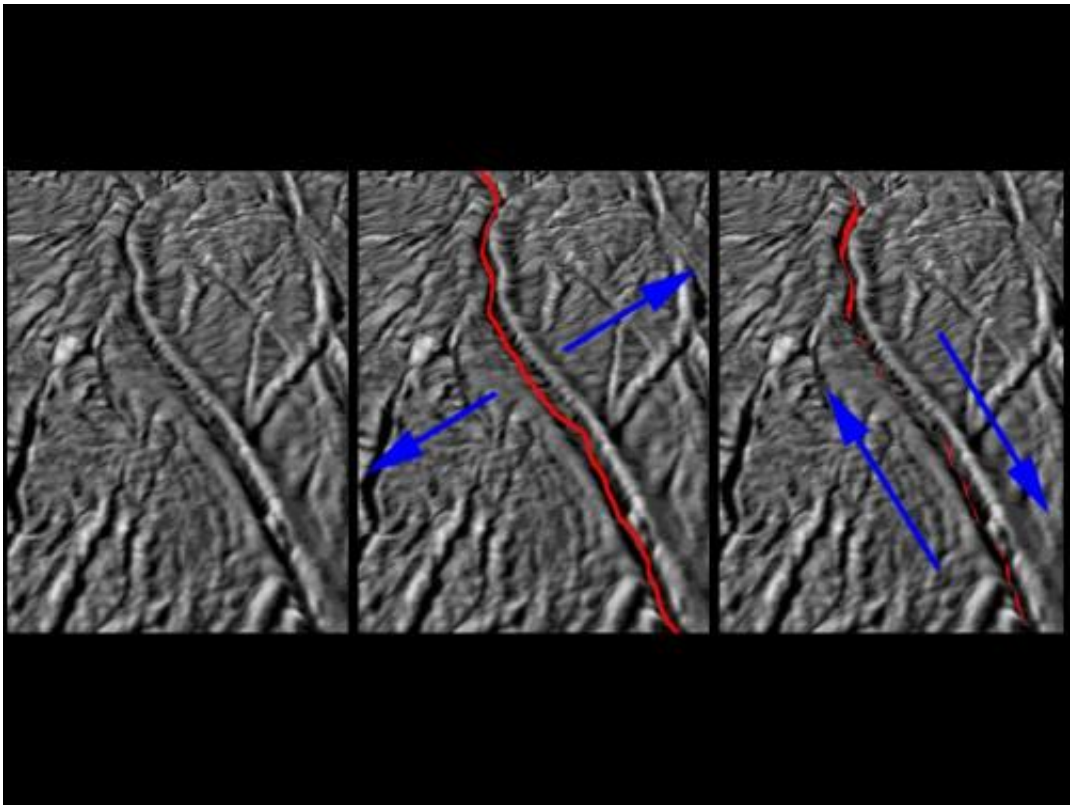

These images, based on ones obtained by NASA's Cassini spacecraft, show how the pull of Saturn's gravity can deform the surface of Saturn's moon Enceladus in the south polar region crisscrossed by fissures known as "tiger stripes." Credit: NASA/JPL-Caltech/SSI/LPI/GSFC

(PhysOrg.com) -- Images from NASA's Cassini spacecraft have, for the first time, enabled scientists to correlate the spraying of jets of water vapor from fissures on Saturn's moon Enceladus with the way Saturn's

gravity stretches and stresses the fissures. The result is among the Cassini findings presented today at the Lunar and Planetary Science Conference at The Woodlands, Texas.

"This new work gives scientists insight into the mechanics of these picturesque jets at Enceladus and shows that Saturn really stresses Enceladus," said Terry Hurford, a Cassini associate based at NASA Goddard Space Flight Center in Greenbelt, Md.

Enceladus is unique in the Saturn system in having jets of water vapor and organic particles spray from long fissures in its south polar region. The long fissures have been nicknamed the "tiger stripes."

Hurford and colleagues suggested a few years ago that tidal pulls from Saturn's gravity could explain the existence of the jets, but they had not been able to correlate specific jets with calculated stresses until now. They studied the jets emerging from the warmest regions within the tiger stripes Baghdad Sulcus and Damascus Sulcus.

The scientists found that the greatest stresses pulling apart the tiger stripes, occurred right after Enceladus made its closest approach to Saturn in its orbit. The scientists found that Saturn's gravitational pull could also deform the fissure by making one side move relative to the other side. That kind of deformation seemed to occur quite often during Enceladus' orbit around the planet, even when Enceladus was very far away.

The finding suggests that a large reservoir of liquid water - a global or local ocean - would be necessary to allow Enceladus to flex enough to generate stresses great enough to deform the surface, Hurford said. That process would control the timing of the jet eruptions. The finding also suggests that Saturn's tides create an enormous amount of heat in the area.

The conference will also include a talk presenting highlights of the Cassini mission by Linda Spilker, Cassini project scientist at NASA's Jet Propulsion Laboratory, Pasadena, Calif. She will present images showing the evolution of an enormous storm that roiled the northern hemisphere of Saturn, the effect of seasonal rain storms on Saturn's moon Titan, and what Cassini will hope to observe in the next few years of its extended mission.

"Cassini's seven-plus years roaming the Saturn system have shown us how beautifully dynamic and unexpected the Saturn system is over time," Spilker said. "We're looking forward to new discoveries as the seasons turn."

The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency.

Provided by JPL/NASA