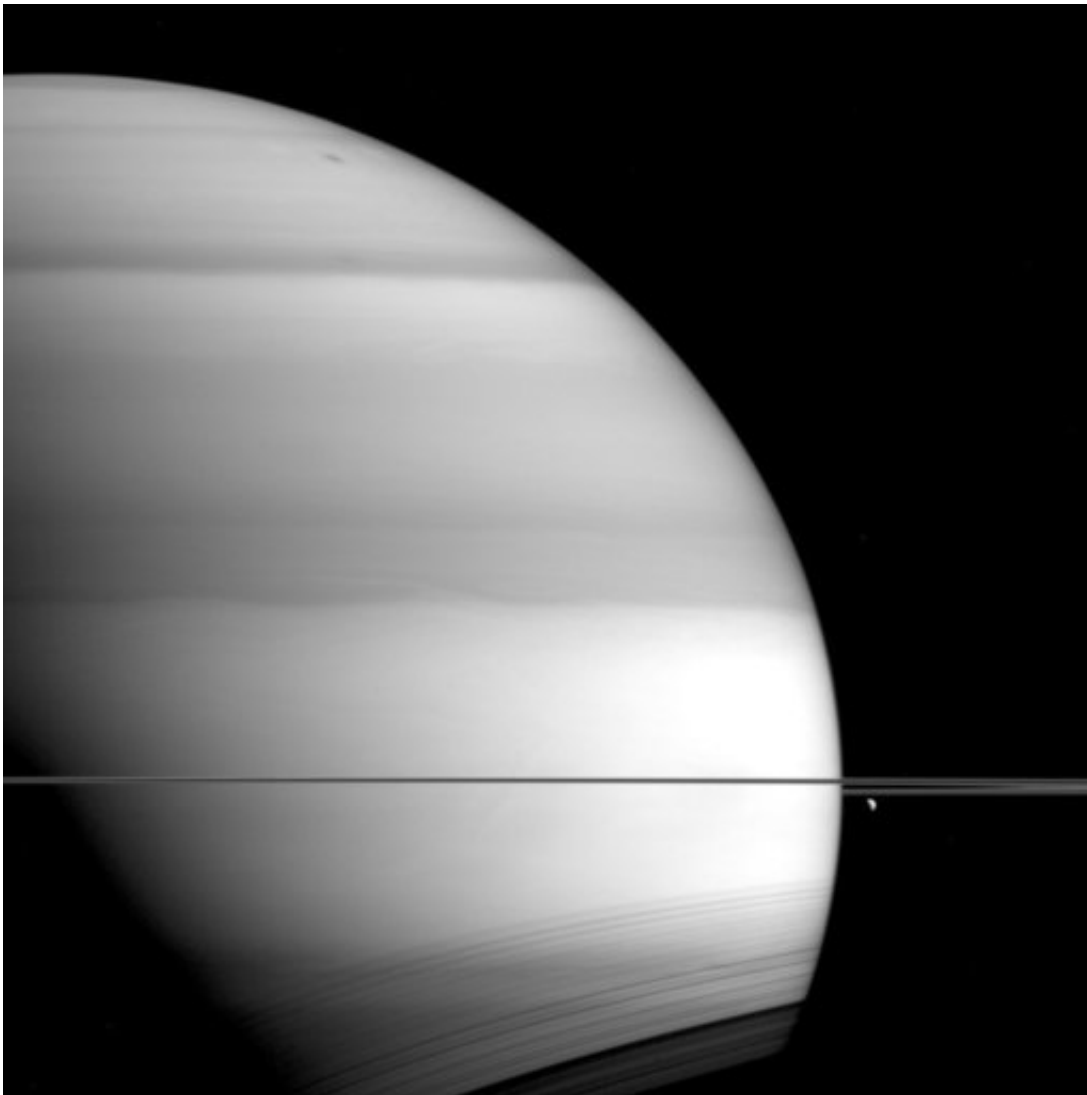


## Cassini spacecraft: 'Magnifying glass' at Saturn until end

September 15 2017, by Marcia Dunn

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This Sept. 6, 2015 image made available by NASA shows bright-and-dark bands in the atmosphere of Saturn, as seen from the Cassini spacecraft. This image was taken in wavelengths of light that are absorbed by methane. Dark areas are

regions where light travels deeper into the atmosphere, passing through more methane. The moon Dione is at right. At bottom are shadows of the planet's rings. (NASA/JPL-Caltech/Space Science Institute via AP)

For more than a decade, NASA's Cassini spacecraft at Saturn took "a magnifying glass" to the enchanting planet, its moons and rings.

Cassini revealed wet, exotic worlds that might harbor life: the moons Enceladus and Titan. It unveiled moonlets embedded in the rings. It also gave us front-row seats to Saturn's changing seasons and a storm so vast that it encircled the planet.

"We've had an incredible 13-year journey around Saturn, returning data like a giant firehose, just flooding us with data," said project scientist Linda Spilker with NASA's Jet Propulsion Laboratory in Pasadena, California. "Almost like we've taken a magnifying glass to the planet and the rings."

Cassini streamed back new details about Saturn's atmosphere right up until its blazing finale on Friday. Its delicate thrusters no match for the thickening atmosphere, the spacecraft tumbled out of control during its rapid plunge and burned up like a meteor over Saturn's skies.

A brief look back at Cassini:

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**TIMELINE:** Cassini rocketed from Cape Canaveral, Florida, on Oct. 15, 1997, carrying with it the European Huygens lander. The spacecraft arrived at Saturn in 2004. Six months later, Huygens detached from Cassini and successfully parachuted onto the giant moon Titan. Cassini

remained in orbit around Saturn, the only spacecraft to ever circle the planet. Last April, NASA put Cassini on an ever-descending series of final orbits, leading to Friday's swan dive. Better that, they figured, than Cassini accidentally colliding with a moon that might harbor life and contaminating it.



In this Oct. 31, 1996 photo made available by NASA, the newly assembled Cassini Saturn probe undergoes vibration and thermal testing at the Jet Propulsion Laboratory facilities in Pasadena, Calif. It was subjected to weeks of "shake and bake" tests that imitate the forces and extreme temperatures the spacecraft would experience during launch and spaceflight. (NASA via AP)

**SPACECRAFT:** Traveling too far from the sun to reap its energy, Cassini used plutonium for electrical power to feed its science instruments. Its separate main fuel tank, however, was getting low when NASA put the spacecraft on the no-turning-back Grand Finale. The mission already had achieved great success, and despite the chance of pounding Cassini with ring debris, flight controllers directed the spacecraft into the narrow gap between the rings and Saturn's cloud tops. Cassini successfully sailed through the gap 22 times, providing ever better close-ups of Saturn.

**RINGS:** Cassini discovered swarms of moonlets in Saturn's rings, including one called Peggy that made the short list for final picture-taking. Scientists wanted one last look to see if Peggy had broken free of its ring. Data from the spacecraft indicate Saturn's rings—which consist of icy bits ranging in size from dust to mountains—may be on the less massive side. That would make them relatively young compared with Saturn; perhaps a moon or comet came too close to Saturn and broke apart, forming the rings 100 million years ago. Or perhaps multiple such collisions occurred. On the flip side, more massive rings would suggest they originated around the same time as Saturn, more than 4 billion years ago.



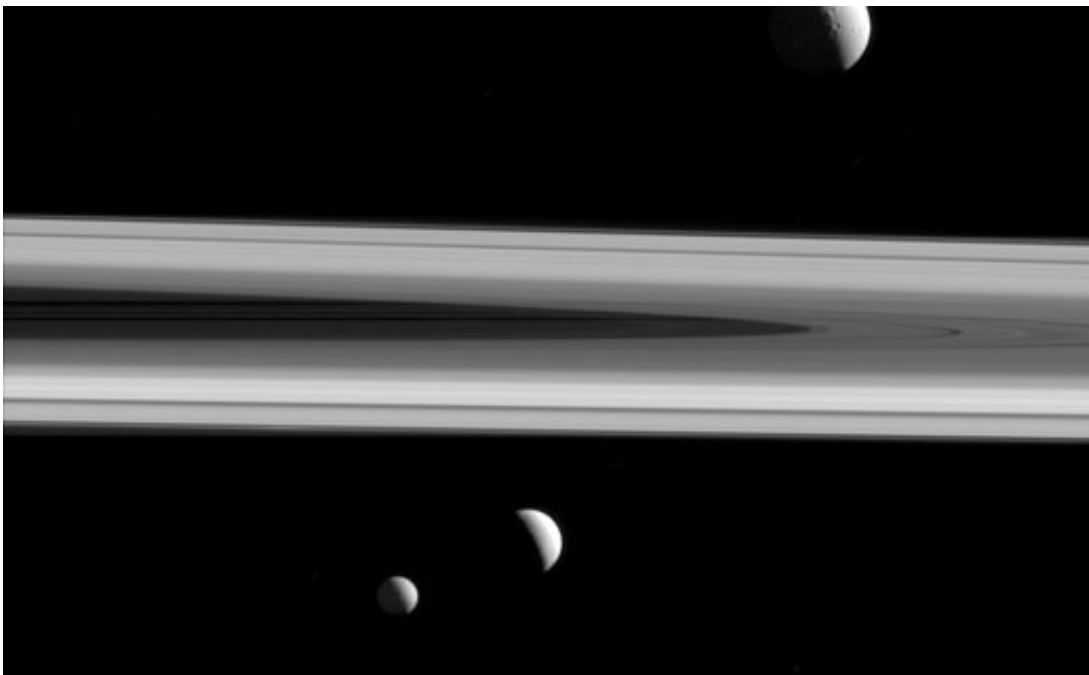
In this Wednesday, March 26, 1997 file photo, a technician checks the heatshield of the space probe Huygens in the cleanroom of Dornier Satellitensysteme GmbH in Ottobrunn, Germany, near Munich. The probe will be carried by NASA's Cassini orbiter and is designed to explore Saturn's moon Titan. (AP Photo/Uwe Lein)

**MOONS:** Saturn has 62 known moons, including six discovered by Cassini. The biggest, by far, is the first one discovered way back in the 1655: Titan, which slightly outdoes Mercury. Its lakes hold liquid methane, which could hold some new, exotic form of life. Little moon Enceladus is believed to have a global underground ocean that could be sloshing with life more as we know it. Incredibly, geysers of water vapor and ice shoot out of cracks in Enceladus' south pole. Spilker of JPL said if she could change one thing about Cassini, it would have been to add

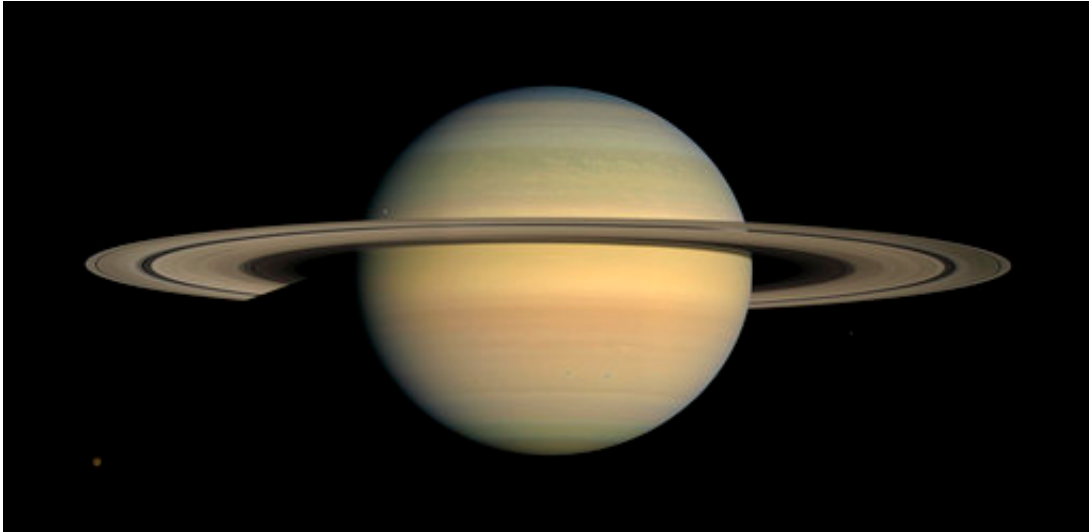


life-detecting sensors to sample these plumes. But no one knew about the geysers until Cassini arrived on the scene.

**NEXT UP:** Scientists would love to return to Enceladus or Titan to search for any potential life. Nothing is firmly on the books right now. But there are proposals to go back, submitted under NASA's New Frontiers program. So stay tuned.



This Dec. 3, 2015 image made available by NASA shows three of Saturn's moons - Tethys, above, Enceladus, second left, and Mimas, seen from the Cassini spacecraft. (NASA/JPL-Caltech/Space Science Institute via AP)



This July 23, 2008 image made available by NASA shows the planet Saturn, as seen from the Cassini spacecraft. After a 20-year voyage, Cassini is poised to dive into Saturn on Friday, Sept. 15, 2016. (NASA/JPL/Space Science Institute via AP)

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