

Last adventure ahead for NASA's Cassini spacecraft at Saturn

April 21 2017, by Marcia Dunn



This image made available by NASA in April 2017 shows a still from the short film "Cassini's Grand Finale," with the spacecraft diving between Saturn and the planet's innermost ring. Launched in 1997, Cassini reached Saturn in 2004 and has been exploring it from orbit ever since. Cassini's fuel tank is almost empty, so NASA has opted for a risky, but science-rich grand finale. (NASA/JPL-Caltech via AP)

NASA's Cassini spacecraft faces one last perilous adventure around Saturn.

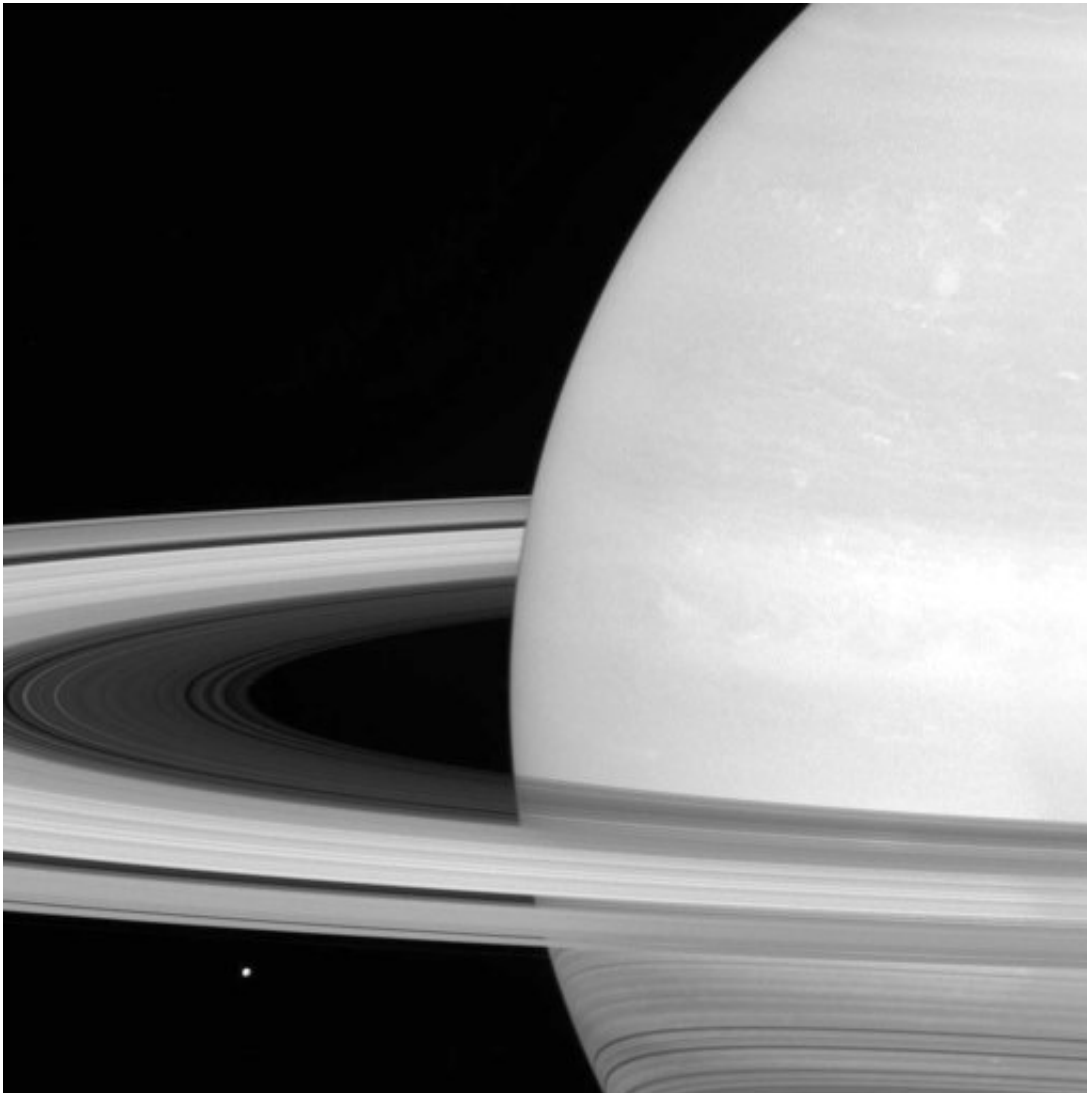
Cassini swings past Saturn's mega moon Titan early Saturday for a gravity-assisted, orbit-tweaking nudge.

"That last kiss goodbye," as project manager Earl Maize calls it, will push Cassini onto a path no spacecraft has gone before—into the gap between Saturn and its rings. It's treacherous territory. A particle from the rings—even as small as a speck of sand—could cripple Cassini, given its velocity.

Cassini will make its first pass through the relatively narrow gap Wednesday. Twenty-two crossings are planned, about one a week, until September, when Cassini goes in and never comes out, vaporizing in Saturn's atmosphere.

Launched in 1997, Cassini reached Saturn in 2004 and has been exploring it from orbit ever since. Its European traveling companion, Huygens, landed on Titan in 2005. Cassini's fuel tank is practically empty, so with little left to lose, NASA has opted for a risky, but science-rich grand finale.

"What a spectacular end to a spectacular mission," said Jim Green, NASA's planetary science division director. "I feel a little sad in many ways that Cassini's discoveries will end. But I'm also quite optimistic that we're going to discover some new and really exciting science as we probe the region we've never probed before."



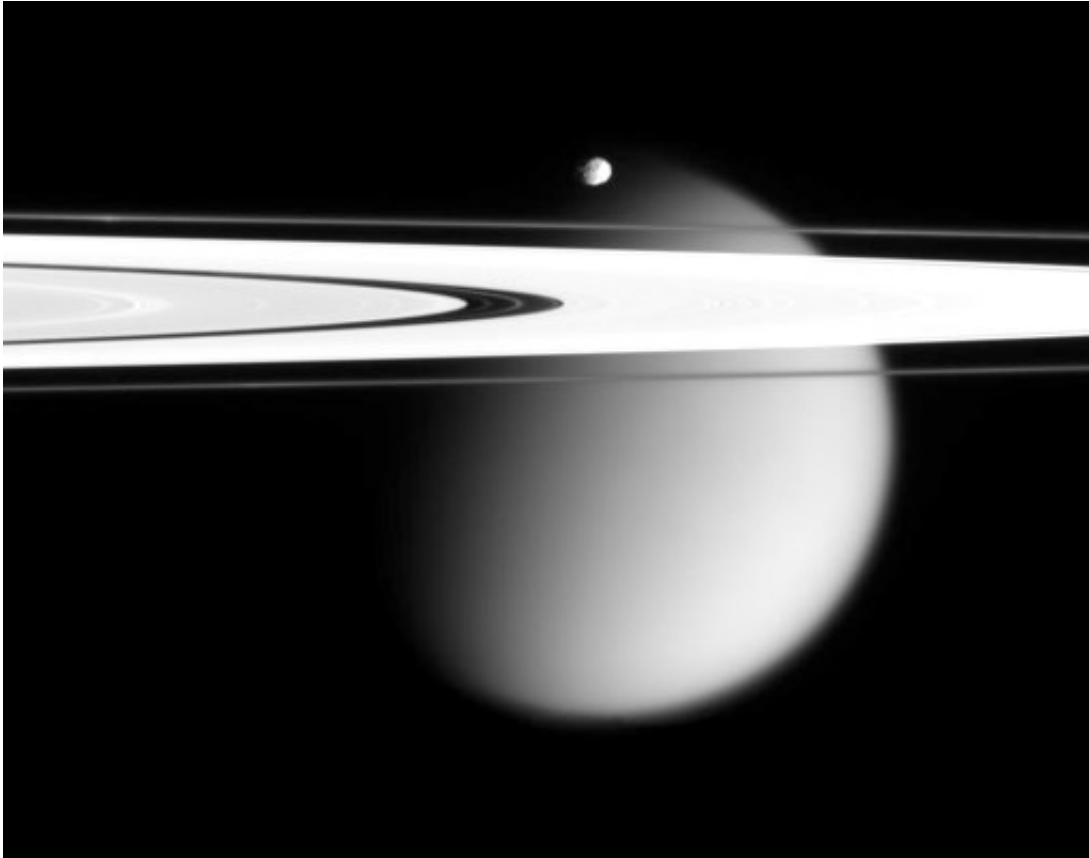
This undated photo made available by NASA shows one of Saturn's moons, Mimas, dwarfed by the planet's rings. Launched in 1997, Cassini reached Saturn in 2004 and has been exploring it from orbit ever since. Cassini's fuel tank is almost empty, so NASA has opted for a risky, but science-rich grand finale. (NASA/JPL-Caltech/Space Science Institute via AP)

There's no turning back once Cassini flies past Titan, Maize said. The spacecraft on Wednesday will hurtle through the 1,200-mile-wide gap (1,900 kilometers) between Saturn's atmosphere and its rings, at a breakneck 70,000-plus mph (113,000 kph).

From a navigation standpoint, "this is an easy shot," Maize said. The operation will be run from NASA's Jet Propulsion Laboratory in Pasadena, California. The concern is whether computer models of Saturn's rings are accurate. On a few of the crossings, Cassini is "kind of flirting with the edge of where we think it's safe," he noted.

For at least the first trip through the gap, Cassini's big dish antenna will face forward to shield the science instruments from any [ring](#) particles that might be lurking there. A couple instruments will provide a quick rundown on the dust situation.

Scientists anticipate lots of lightweight impacts, since the spacecraft will be going through extremely small material, more like smoke than distinct particles. Material from the innermost D ring—which is slowly extending into Saturn—should be diffuse enough "that we should be fine," Maize said.



This image made by the Cassini spacecraft and provided by NASA on March 12, 2006, shows two of Saturn's moons, the small Epimetheus and smog-enshrouded Titan, with Saturn's A and F rings stretching across the frame. Launched in 1997, Cassini reached Saturn in 2004 and has been exploring it from orbit ever since. Cassini's fuel tank is almost empty, so NASA has opted for a risky, but science-rich grand finale. (AP Photo/NASA)

If the models are wrong and Cassini is clobbered by BB-size material, it still will end up exactly where NASA is aiming for on Sept. 15—at Saturn. The space agency wants to keep the 22-foot-high, 13-foot-wide spacecraft away from Titan and its lakes of liquid methane and from the ice-encrusted moon Enceladus and its underground ocean and spouting geysers. It doesn't want to shower contaminating wreckage onto these worlds that might harbor life.

This last leg of Cassini's 20-year, \$3.27 billion voyage should allow scientists to measure the mass of the multiple rings—shedding light on how old they are and how they formed—and also to determine the composition of the countless ring particles. First spotted by Galileo in 1610, the rings are believed to be 99 percent ice; the remaining 1 percent is a mystery, said project scientist Linda Spilker. A cosmic dust analyzer on Cassini will scoop up ring particles and analyze them.

"Imagine the pictures we're going to get back of Saturn's rings," Spilker said.

Cassini will have the best views ever of Saturn's poles, as it skims its surface. Near mission's end, Spilker said, "we're actually going to dip our toe" into Saturn's atmosphere, sending back measurements until the last possible moment.



This April 12, 2017 image provided by NASA shows planet Earth and the moon, center left, as small points of light behind the rings of Saturn, captured by the Cassini spacecraft, 870 million miles (1.4 billion kilometers) away from Earth. Launched in 1997, Cassini reached Saturn in 2004 and has been exploring it from orbit ever since. Cassini's fuel tank is almost empty, so NASA has opted for a risky, but science-rich grand finale. (NASA via AP)

All this is on top of a science mission that already has rewritten the textbooks on the Saturnian system.

"But the best is still yet to come—perhaps," Maize said at a news conference in early April. "But we are certainly going to provide more excitement."

More information: NASA: saturn.jpl.nasa.gov/

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