



The Cassini-Huygens spacecraft was created for a mission to Saturn.

Cassini is the orbiter; Huygens is the probe. Both work together to return data to Earth about the planet Saturn, its rings, its moons (especially its largest, Titan) and related interesting information.

The orbiter has a high-gain antenna. It serves as a relay between the spacecraft's work at Saturn and the Cassini-Huygens team on Earth.

Arriving at Saturn's system on the 1st of July, 2004, Cassini-Huygens began its work on Titan when the orbiter released the probe for its Titan-bound mission on November 27, 2004. The combined parts of the spacecraft have twelve onboard instruments to collect Saturn-related data.

The Cassini orbiter is two-stories tall. At launch, it weighed 11,594 pounds (5,300 kilograms). More than half of the orbiter's mass is propellant.

The Huygens probe was built by the European Space Agency (ESA). It is 8.86 feet (2.7 meters) in diameter. At launch, it weighed about 766 pounds (350 kilograms).

JPL (the Jet Propulsion Laboratory), at Cal Tech, manages the Cassini-Huygens mission for NASA. The ESA (European Space Agency), together with the Italian Space Agency (and numerous other European and American industrial and academic partners) worked with NASA to make Cassini-Huygens a reality.

Their joint efforts have been splendidly rewarded by the data which the orbiter and probe regularly send to Earth. But ... all of that will end in 2017 because Cassini's final actions will result in its planned destruction.

Why would NASA and the ESA want to end the life of this magnificent spacecraft? In short ... because the only way to learn as much as we can, about Saturn's rings, is to send Cassini on a life-ending mission. It's called Cassini's "Grand Finale."

Before Cassini disintegrates (by burning up), it will make 22 dives through Saturn's rings.



Everyone hopes that the spacecraft can perform without any complications! NASA's Jet Propulsion Lab (in Pasadena, California) has created an animation to depict what will happen during Cassini's Grand Finale.

After a final close fly-by of Titan, one of Saturn's moons, Cassini will start the Grand Finale when it leaps over

(to use NASA's words) the planet's rings to begin examining them more closely. That mission will require Cassini to make 22 weekly dives—between April and September of 2017—as it explores those icy rings.

Why is Cassini undertaking this series of dives? Scientists, working at NASA's Jet Propulsion Lab, answer that question (plus several others):

No other mission has ever explored this unique region. What we learn from these final orbits will help to improve our understanding of how giant planets - and planetary systems everywhere - form and evolve.

Can we see how Earth appears, to the orbiter, as it travels between Saturn's icy rings? Yes, we can—but Earth looks so tiny it seems like nothing more than a point of light.

What will happen after Cassini's final dive?

On the final orbit, Cassini will plunge into Saturn's atmosphere, sending back new and unique science to the very end. After losing contact with Earth, the spacecraft will burn up like a meteor, becoming part of the planet itself.

How close will Cassini come to the rings themselves?

At times, the spacecraft will skirt the very inner edge of the rings; at other times, it will skim the outer edges of the atmosphere. While the mission team is confident the risks are well understood, there could still be surprises. It's the kind of bold adventure that could only be undertaken at the end of the mission.

What will Cassini examine, and hopefully find, during this very risky part of her nearly 20-year mission to Saturn?

The spacecraft will make detailed maps of Saturn's gravity and magnetic fields, revealing how the planet is arranged internally, and possibly helping to solve the irksome mystery of just how fast Saturn is rotating.

The final dives will vastly improve our knowledge of how much material is in the rings, bringing us closer to understanding their origins.

Cassini's particle detectors will sample icy ring particles being funneled into the atmosphere by Saturn's magnetic field.

Its cameras will take amazing, ultra-close images of Saturn's rings and clouds.

If all goes according to plan, will Cassini send data to Earth even during its final plunge?

Cassini's final images will have been sent to Earth several hours before its final plunge, but even as the spacecraft makes its fateful dive into the planet's atmosphere, it will be sending home new data in real time. Key measurements will come from its mass spectrometer, which will sample Saturn's atmosphere, telling us about its composition until contact is lost.

While it's always sad when a mission comes to an end, Cassini's finale plunge is a truly spectacular end for one of the most scientifically rich voyages yet undertaken in our solar system. From its launch in 1997 to the unique Grand Finale science of 2017, the Cassini-Huygens mission has racked up a remarkable list of achievements.

If the data transmitted from Cassini to Earth has been so significant, why is NASA ending the mission in 2017?

By 2017, Cassini will have spent 13 years in orbit around Saturn, following a seven-year journey from Earth. The spacecraft is running low on the rocket fuel used for adjusting its course. If left unchecked, this situation would eventually prevent mission operators from controlling the course of the spacecraft.

Two moons of Saturn, Enceladus and Titan, have captured news headlines over the past decade as Cassini data revealed their potential to contain habitable - or at least "prebiotic" - environments.

In order to avoid the unlikely possibility of Cassini someday colliding with one of these moons, NASA has chosen to safely dispose of the spacecraft in the atmosphere of Saturn. This will ensure that Cassini cannot contaminate any future studies of habitability and potential life on those moons.

We can expect to see many stunning images from Cassini during the spacecraft's diving Grand Finale. From the first dive—on April 26, 2017—to the last, you can track its progress and milestones by checking-in with NASA.

The image, at the top of this page, depicts Cassini-Huygens before its launch. Click on it for a much-better view.

Credits:

Image, described above, online courtesy NASA / JPL.

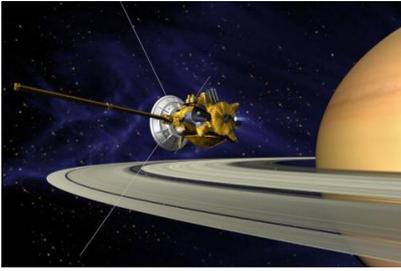
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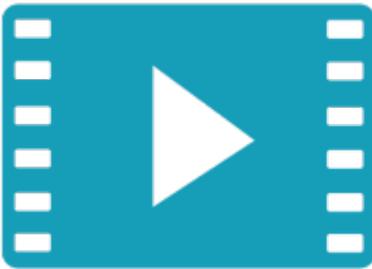
Cassini-Huygens Orbits Around Saturn

NASA / JPL image PIA03883. Online, courtesy NASA.

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Huygens Probe Reaches Titan

Video, courtesy NASA.

Mission: ESA/NASA/JPL/University of Arizona

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