

Cassini Huygens Mission

American Museum of Natural History, Hayden Planetarium
Adult Digital Flight School
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Turn on

- Saturn
- Saturn's moons
- Saturn's aurora
- Cassini and Cassini's orbit

While flying summarize mission

Cassini launched in October 1997 with the European Space Agency's Huygens. It is a joint mission of NASA, ESA and the Italian Space Agency.

- Fly to Saturn
- Target Cassini
- Fly around Cassini until you see the sun
- Target earth
- Return view to Cassini's path and moon orbits

Saturn has 62 moons and 53 of them are named. Most have icy surfaces and all have craters. Cassini has recorded phenomena from ethane and methane rivers and lakes on Titan, Saturn's largest moon, to an internal ocean and water jets spraying through icy cracks on Enceladus and even tectonic activity on Dione and Tethys. Notice how Cassini's orbit encompasses the outer rings of Saturn and the outer moons.

Cassini Initial Mission

2004-June 2008

Initial Approach spanned four years

Cassini Equinox Mission

June 2008 to September 2010

Cassini Solstice Mission

September 2010-May 2017

This is where we are now. In fact we are nearing the end of Cassini's journey. We learned a lot during this phase about Saturn's rings and the effect of its magnetosphere on moons like Enceladus.

Titan

Among the Cassini Mission's most important targets of the mission are the moons Titan and Enceladus, as well as some of Saturn's other icy moons. We'll go to Titan first.

- Target Titan

- Fly to Titan

Titan is Saturn's sixth elliptical moon. The orange haze you see here is Titan's thick, smog-filled atmosphere. It is the only moon in the solar system known to have such an atmosphere so it was of interest to send a probe to study it. When the ESA's Huygens probe was released to the icy surface of the moon on January 14, 2005, it was the first time a landing was achieved on a body in the outer solar system.

The Huygens probe revealed vast methane lakes and hydrocarbon sand dunes that appear to be sculpted by the wind. Researchers received data about the structure and complex organic chemistry of Titan through data sent by the Huygens probe. They also deduced the presence of an internal, liquid ocean made of water-ammonia.

Enceladus

- fly to Enceladus

This is Enceladus, another moon of Saturn that was of great interest to the research teams. An approach on October 28, 2015 took us within 30 km of the southern pole where Cassini discovered an icy plume shooting out at great distances. Observations have revealed the spray contains complex organic chemicals. Cassini made its last approach of Enceladus on December 21, 2015.

Geologic activity on Enceladus was noted as early as 2005. More recently, Cassini made a series of discoveries about the material gushing from the warm fractures near its south pole. According to NASA, tidal heating is keeping Enceladus warm, and hotspots associated with the fountains have been pinpointed. With heat, organic chemicals and, potentially liquid water, we wonder whether primitive life forms might evolve under these conditions. Many of the investigations being conducted in the Solstice Mission are exploring Enceladus's "astrobiological potential."

Magnetosphere

- Show aurora

Water ice jets from Enceladus play a major role in Saturn's magnetosphere. Enceladus' magnetosphere is quite close. Water from the jets loads up the magnetosphere, influencing radio and auroral activity, and can cause changes in the rotation of the magnetic field itself.

Cassini's will continue to study these phenomena as it travels the huge sphere of magnetic activity that surrounds Saturn.

Rings

-pull back to rings

The last thing I want to look at is Saturn's iconic rings. We see the rings as bands of light and dark shaded areas. Some of the rings are not visible in this view. Cassini had found Saturn's rings to be a complex and active place where small moons and other particles jostle and collide. A very small moon about a half mile in diameter was recently discovered orbiting along the G Ring, which is one of the thin outer rings. Other activity, like waves and jets, were found constantly forming and dissipating in Saturn's rings.

Cassini will make closer studies of the planet and its rings during the final phase of the Solstice mission ending in June 2017 when it will plunge through Saturn's atmosphere in its final act. But it's not over yet.

Recent Activity

March 11, this month, Cassini's Ultraviolet Imaging Spectrometer was scheduled to measure light from a star as it passes behind one of Enceladus' plumes to get data on the composition, velocity and density of the plume.

On April 4 next week Cassini makes another flyby of Titan measuring atmospheric density. And on May 6 it will track along the surface from a distance of about 990km to measure surface characteristics and possibly a lake. So there is still a lot to see before the mission is complete.

For more details and spectacular images of this mission, visit NASA's Jet Propulsion Lab online at saturn.jpl.nasa.gov.