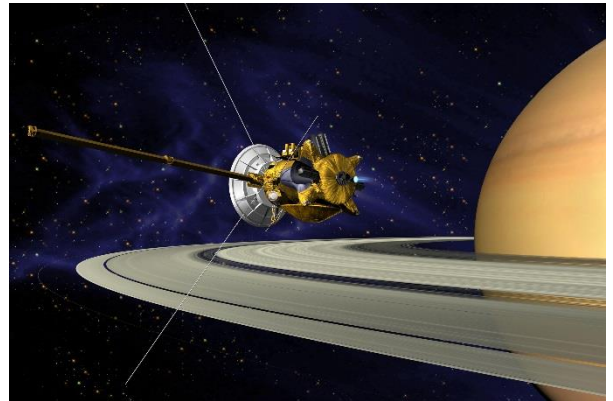


Fact sheet: Cassini's 'Grand Finale'

NASA's Cassini spacecraft is nearing the end of its historic mission to explore Saturn and its environs. The Canberra Deep Space Communication Complex, managed for NASA by CSIRO, will receive Cassini's final signals before it plunges into Saturn's atmosphere.

Cassini-Huygens mission

- First proposed in 1982, the Cassini-Huygens mission was established as a joint venture between NASA, European Space Agency (ESA) and the Italian Space Agency (with a total participation by 26 nations). It is a 'Flagship-class' NASA mission with a budget of US\$3.26 billion.
- The spacecraft was made up of two elements: the Cassini orbiter and Huygens probe.
- Launched on 15 October 1997 from Cape Canaveral, Florida, the spacecraft carried 12 powerful instruments and cameras to provide accurate measurements and detailed images.
- Cassini's seven-year flightpath to Saturn took it past Venus twice, the Earth once, and Jupiter once using gravity slingshots at each planet.
- Cassini arrived in Saturn's orbit on 1 July 2004 (AEST).
- The ESA's Huygens probe detached itself from the spacecraft on 24 December 2004 and descended onto Titan, a moon of Saturn, on 14 January 2005. It was the first outer Solar System landing and our most distant landing from Earth to date.
- Cassini will have orbited Saturn 293 times, returning over 450,000 images and 635Gb of data. This voyage is one of the most scientifically rich space voyages ever undertaken.



Key discoveries from the Cassini-Huygens mission

- Cassini discovered half a dozen new moons at Saturn.
- The Huygens probe successfully landed on the moon Titan, which we now know is an Earth-like world with rain, rivers, lakes and seas of liquid methane.
- On the moon Enceladus, active, water-ice plumes were discovered along with evidence of hydrothermal vents and organic chemistry.
- Cassini revealed Saturn's rings as complex structures that are active and dynamic, a unique laboratory for how planets and moons form.
- It showed vertical structures 2.5 km high in Saturn's rings, and new features including clumping material dubbed 'propellers'.
- Cassini undertook the first direct measurements of Saturn's atmospheric composition.
- It gave us the first complete view of the north polar 'hexagon', discovered giant hurricanes at both of Saturn's poles, and studied a planet-wrapping great northern storm in 2010-2011.

Spin-offs from Cassini

In addition to scientific knowledge, Cassini's mission has generated technological spin-offs from:

- solid state recorders and advanced integrated circuits used in everyday electronics
- data analysis and power diagnostic software used in medical drugs and AIDs research
- pollution credit trading tools, and
- web-based software-hardware interfaces that allow remote operation of electronic goods in your home.

End of the Cassini mission

- Cassini has been operating for 20 years and is running out of fuel.
- The planned descent into Saturn prevents the spacecraft from colliding with the moons Enceladus and Titan, which might be targets for future exploration. This avoids any possible contamination from hardy Earth microbes that might have stowed away and survived the journey on Cassini intact.
- The atmospheric drag will cause the spacecraft to tumble, and the antenna signal connection to Earth will be severed as the spacecraft burns up like a meteor.
- The end of mission is estimated to occur at approximately **9:54pm AEST on Friday 15 September 2017**. (NB: Final time may change after data received after penultimate dive.)
- Australians and the world will be able to watch live at csiro.au/cassini with a link to NASA TV, as the spacecraft finishes its final orbit and plunges into Saturn's atmosphere.

Role of Canberra Deep Space Communication Complex

- The Canberra Deep Space Communication Complex (CDSCC) is part of NASA's Deep Space Network, one of three space tracking stations around the world that provide vital two-way radio contact with spacecraft across the Solar System and beyond.
- It has been providing two-way radio contact with Cassini since its launch in October 1997.
- It tracked Cassini as it entered orbit at Saturn in July 2004 (AEST).
- CDSCC received data and images from Huygens as it descended into the atmosphere and landed on the surface of Saturn's largest moon, Titan. CSIRO's Parkes radio telescope also received Doppler-shift data of Huygens' signal.
- It performed dozens of unique radio science experiments with the Cassini team to measure the size and distribution of particles in Saturn's rings, and measured the terrain and depths of lakes on the surface of Titan (using bi-static radar observations).
- CDSCC will be the receiving station for the final hours of this mission. It will commence tracking Cassini at 1.15pm AEST on 15 September 2017 and capture the final ~9 hours of data which is being collected by Cassini's instruments in real-time and returned to Earth.



Facts about Saturn

- Saturn was known by the Ancients and is the most distant planet that can be observed with the naked eye.
- Saturn is the 6th planet of the Solar System and orbits at an average of 1.43 billion km from the Earth.
- The planet is 106,464 km in diameter, and its atmosphere is primarily hydrogen and helium.
- The rings are approximately 200,000 km in diameter. Particles in the rings are rock and ice, and range from dust grains to mountain-sized.
- A day on Saturn is equivalent to approximately 10.65 hours and average temperature is -178°C.
- Saturn has 53 confirmed moons and 9 provisional moons.

About CSIRO

CSIRO is Australia's national science agency. For 100 years we've delivered positive impact from science and technology, and have a long and successful history in the space sector:

- Australia's southern hemisphere location is a great natural asset for astronomy and space science, which is complemented by our proven ability to manage large, complex facilities with a high degree of reliability.
- We understand the power of Earth observation data to inform policy, manage natural environments and generate agricultural and industrial development opportunities.
- Our partnerships with industry are delivering breakthrough innovations that range from imaging and sensor technologies through to autonomous robotics and new materials and manufacturing processes.

More information

For more information on Cassini visit:

- CSIRO Cassini microsite: <https://www.csiro.au/cassini>
- CDSCC website: <https://www.cdsc.nasa.gov>
- NASA mission website: <https://saturn.jpl.nasa.gov>
- View the event on NASA LiveTV: <https://www.nasa.gov/multimedia/nasatv/index.html#public>

Join in on social media

Follow along with Cassini's 'Grand Finale':

- CSIRO/CDSCC hashtag: #CassiniAus
- Official mission hashtag: #GrandFinale

Sources:

Page 1 image: NASA / Jet Propulsion Laboratory-Caltech

Cassini mission technical information: <https://saturn.jpl.nasa.gov/>