Explained in 60 seconds: What has the *Cassini* Mission Taught us?

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In 1997, a rocket was launched carrying an orbiter that would change our view of Saturn forever: *Cassini*. This would be the fourth time that we had sent a spacecraft to Saturn, but this time the probe was there to stay.

Cassini has been in orbit around the gas giant Saturn since July 2004, discovering new phenomena and taking awe-inspiring pictures. On its long journey through the Solar System *Cassini* was accompanied by the lander *Huygens*. In January 2005, after travelling 3.5 billion kilometres together, *Huygens* finally forged its own path and parachuted into the thin methane atmosphere of Saturn's moon Titan, drifting towards an unknown fate. As it went, *Huygens* revealed a stunningly familiar world beneath Titan's hazy atmosphere, taking sublime images of rugged landscapes with vast sand dunes, floodplains, river channels and sea beds.

Orbiting Saturn alone *Cassini* also made a swathe of spectacular observations. It unveiled new secrets about Saturn's potentially life-supporting moons, including the discovery of active, icy plumes and a salty subsurface ocean on the moon Enceladus. The spacecraft saw Saturn's ring system change in front of it, revealing a dynamic and active system akin to a small Solar System. It also studied gigantic storms, flashing lightning, colossal winds and unusual hexagonal hurricanes at each of Saturn's poles.

In the concluding phases of its pioneering adventure, *Cassini* made twenty-two final orbits around Saturn, including a series of life-threatening dives through Saturn's upper atmosphere as well as its innermost ring, gleaning information about how giant planets form. As it orbited, *Cassini* collected rich and valuable data about Saturn's gravity, magnetic fields and internal structure, and also about the rings themselves, which may reveal details of their mysterious origin. After completing these tasks, the spacecraft made a final sacrifice as it plunged through Saturn's atmosphere on 15 September 2017. In its last minute of communication, the craft sent back one final batch of images — a final addition to a collection of data that paved the way for the exploration of the Solar System and our quest for the origins of life itself — and then we lost contact with *Cassini* forever.

Figure 1. *In this rare image taken on 19 July 2013,* Cassini's *wide-angle camera captures the Earth and its moon in the same frame. Credit: NASA/JPL-Caltech/Space Science Institute*