SAMPLE

Solar System Missions: Cassini-Huygens

Saturn Revealed

Aira Astralis

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This free sample contains the Introduction and Chapter 1. The complete book contains the full contents above.

Introduction

Cassini was the fourth space probe to visit Saturn and the first to enter its orbit, where it stayed from 2004 to 2017. The two craft took their names from the astronomers Giovanni Cassini and Christiaan Huygens.

Launched aboard a Titan IV-B with a Centaur D-1T upper stage on October 15, 1997, Cassini was active in space for nearly 20 years, spending almost 7 years in transit and 13 years orbiting Saturn, studying the planet and its system after entering orbit on July 1, 2004.

Cassini had 1,630 interconnected electronic components, 22,000 wire connections, and 14 kilometers (8.7 mi) of cabling.

Even if response were immediate, more than two hours would have passed between the occurrence of a problem and the reception of the engineers' response by the satellite.

Composite Infrared Spectrometer (CIRS)

Imaging Science Subsystem (ISS)

Ultraviolet Imaging Spectrograph (UVIS)

Visual and Infrared Mapping Spectrometer (VIMS)

Fields, Particles and Waves (mostly in situ)

Cassini Plasma Spectrometer (CAPS)

Cosmic Dust Analyzer (CDA)

Ion and Neutral Mass Spectrometer (INMS)

Magnetometer (MAG)

Radio and Plasma Wave Science (RPWS)

Microwave Remote Sensing

Radar

Radio Science (RSS)

The CIRS was a remote sensing instrument that measured the infrared radiation coming from objects to learn about their temperatures, thermal properties, and compositions. Throughout the Cassini-Huygens mission, the CIRS measured infrared emissions from atmospheres, rings and surfaces in the vast Saturn system. It mapped the atmosphere of Saturn in three dimensions

to determine temperature and pressure profiles with altitude, gas composition, and the distribution of aerosols and clouds.

It also measured thermal characteristics and the composition of satellite surfaces and rings. Ion and Neutral Mass Spectrometer (INMS)

The INMS was an in situ instrument that measured the composition of charged particles (protons and heavier ions) and neutral particles (atoms and molecules) near Titan and Saturn to learn more about their atmospheres. The instrument used a quadrupole mass spectrometer. INMS was also intended to measure the positive ion and neutral environments of Saturn's icy satellites and rings.

Imaging Science Subsystem (ISS)

The instrument used the spacecraft X-band communication link as well as S-band downlink and Ka-band uplink and downlink. Ultraviolet Imaging Spectrograph (UVIS)

The UVIS was a remote-sensing instrument that captured images of the ultraviolet light reflected off an object, such as the clouds of Saturn and/or its rings, to learn more about their structure and composition.

At the end of the nominal 11-year Cassini mission, they were still able to produce 600 to 700 watts of electrical power.

On April 3, 2014, nearly ten years after Cassini entered Saturn's orbit, NASA reported evidence of a large salty internal ocean of liquid water in Enceladus.

Chapter 1: The Discovery of Cassini-Huygens

On July 19, 2013, the probe was pointed towards Earth to capture an image of the Earth and the Moon, as part of a natural light, multi-image portrait of the entire Saturn system.

NASA - Through the Eyes of Cassini

Huygens (HOY-g?nz) was an atmospheric entry robotic space probe that landed successfully on Saturn's moon Titan in 2005.

The GBT continued to detect the carrier signal well after Cassini stopped listening to the incoming data stream.

The temperature at the landing site was 93.8 K (?179.3 °C; ?290.8 °F) and pressure of 1,467.6 mbar (1.4484 atm), implying a methane abundance of 5 ± 1% and methane relative humidity of 50% near the surface. Therefore, ground fogs caused by methane in the neighborhood of the landing site are unlikely.

The Huygens SSP was developed by the Space Sciences Department of the

University of Kent and the Rutherford Appleton Laboratory Space Science Department (now RAL Space) under the direction of Professor John Zarnecki. The SSP research and responsibility transferred to the Open University when John Zarnecki transferred in 2000.

The flyby distance was about 1,180 km (730 mi). 17 March 2005 - The Cassini probe revealed that Saturn's moon Enceladus has an atmosphere. It has been described as "substantial" by its discoverers. 16 April 2005 - The fifth planned flyby of Titan with a minimum distance of about 1,025 kilometers was executed at 19:12 UTC.

This was the closest flyby up to this date, and provided the opportunity to obtain more detailed data on the constituents in the upper atmosphere of Titan.

End of free sample. The full book is available at putrabooks.github.io

ABOUT THE AUTHOR

Aira Astralis is a science writer specializing in astronomy and space exploration. Her work spans the full breadth of humanity's relationship with the cosmos -- from the earliest naked-eye observations to the engineering marvels of modern space missions.

Her books are built on a foundation of primary sources: peer-reviewed research, mission archives, and direct engagement with the scientific community. She writes for readers who want to understand not just what we know about the universe, but how we came to know it.

She believes that the most important frontier is not out there but in the gap between what scientists discover and what the public understands. Her books exist to close that gap.