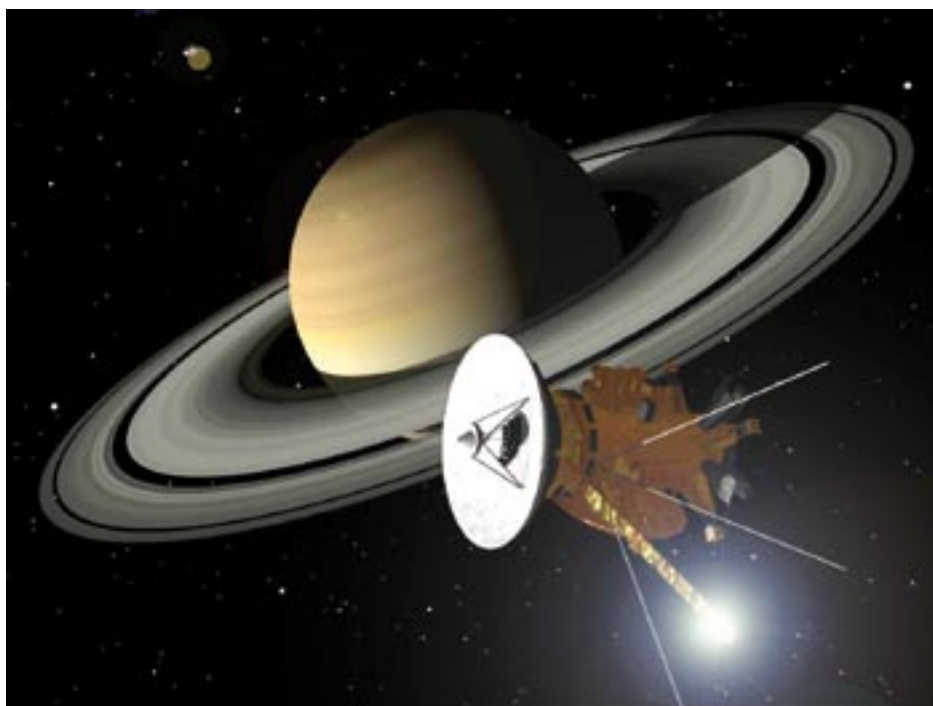


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*Artist's conception of Cassini approaching Saturn. (Courtesy NASA/JPL-Caltech)*

# Update on the Cassini-Huygens Mission

In Vaisala News 167 we reported on the Cassini-Huygens space mission that set out to explore planet Saturn and the largest of its known moons, Titan. The mission has two distinct elements: the Cassini orbiter and the onboard Huygens probe. Released from Cassini, the Huygens probe successfully landed on Titan in January 2005. It carried eight Vaisala BAROCAP® barometric pressure sensors on board as part of one of its six science instruments.

**S**aturn is the second largest planet in our solar system, after Jupiter. It is a gaseous planet with an atmosphere comprising mostly of hydrogen and helium. The bright rings for which Saturn is best known are comprised of ice and rock particles.

Saturn has more moons than any other planet known to us. The largest of them is the aptly named Titan, discovered by

Dutch scientist Christiaan Huygens in 1655. Saturn itself was first spotted by Italian astronomer Galileo in 1609. Since then, its mysteries have fascinated scientists worldwide.

To shed light on the conditions on and around the sixth planet from the Sun, a spacecraft was constructed in a joint effort by NASA, the Italian Space Agency (ASI), the European Space Agency (ESA), as well as

numerous scientists worldwide. The Cassini-Huygens spacecraft was launched on October 15, 1997 from Cape Canaveral in Florida, USA.

After years of traveling through space, and borrowing gravitational energy from other planets to speed it on its way, the Cassini-Huygens spacecraft entered the Saturn system on July 1, 2004. This marked the start of its 4-year mission. The Cassi-

ni orbiter will carry out a total of 75 orbits around Saturn. It will also make repeated close flybys of Titan.

## Exploring Titan

Titan is a captivating object of study, as it exhibits many similarities to conditions that may well have once prevailed on Earth. It has a nitrogen-rich atmosphere like Earth, and although most agree that its surface tempera-



*Huygens probe landing on Titan's surface, artist's rendition (Courtesy NASA/JPL-Caltech)*

ture (-181 °C) is too hostile for the development of life, there are also those who do not exclude the possibility of some life forms existing on Titan.

On December 25, 2004, the Huygens probe separated from the Cassini spacecraft for its 20 day journey to Titan. It successfully entered Titan's upper atmosphere on January 14, 2005, and descended with three sets of parachutes to its surface. The descent phase lasted around 2 hours 27 minutes with a further 1 hour 10 minutes on the surface. The mission was a complete success. Obtaining surface data was more than many had dared to hope for since there were no guarantees that the probe would survive the landing. Huygens made history by being the first spacecraft to land on a moon in the outer solar system.

#### **HASI: Huygens Atmosphere Structure Instrument**

The Huygens probe carried six science instruments to sample

Titan's atmosphere and surface properties. Throughout the mission, data was collected from all instruments. One of these was the Huygens Atmosphere Structure Instrument (HASI) - a multi-sensor package designed to measure the physical properties of Titan's atmosphere. Its task was to measure the temperature, pressure, turbulence, and the atmospheric conductivity, as well as to search for lightning.

HASI's sensor package devoted to atmospheric pressure measurement - the Pressure Profile Instrument (PPI) developed by the Finnish Meteorological Institute - contained eight Vaisala BAROCAP® barometric pressure sensors. BAROCAP® is a capacitive absolute pressure device manufactured by silicon micro-machining. When pressure changes, the silicon diaphragm bends and changes the height of the vacuum gap in the sensor. This alters the sensor's capacitance, which is measured and converted into a pressure reading. The Vaisala BAROCAP® is

known for its excellent hysteresis and repeatability characteristics as well as its outstanding temperature and long-term stability.

#### **The mission continues**

As data from the Huygens probe is being analyzed, the story of Titan gradually starts to unfold. For instance, we now know that Earth-like processes of tectonics, erosion, winds, and perhaps volcanism, shape Titan's surface. However, the work has only just begun - there's enough data to keep Huygens scientists busy for a long time yet.

Although the Huygens mission has been successfully completed, the Cassini spacecraft will continue its orbits until June 2008 - providing scientists with vital data and the best views ever of this fascinating, vast region of our solar system. ●

**Sources:**  
ESA/NASA/JPL