



Cassini-Huygens Science Highlights: Surprises in the Saturn System

Linda Spilker (1), Nicolas Altobelli (2), and Scott Edgington (1)

(1) Jet Propulsion Laboratory/California Institute of Technology, Pasadena, CA, USA, (Linda.J.Spilker@jpl.nasa.gov), (2) ESA/ESAC, Villafranca del Castillo, Madrid, Spain, (nicolas.altobelli@sciops.esa.int)

The Cassini-Huygens mission has greatly enhanced our understanding of the Saturn system. Fundamental discoveries have altered our views of Saturn, its retinue of icy moons including Titan, the dynamic rings, and the system's complex magnetosphere. Launched in 1997, the Cassini-Huygens spacecraft spent seven years traveling to Saturn, arriving in July 2004, roughly two years after the northern winter solstice. Cassini has orbited Saturn for 9.5 years, delivering the Huygens probe to its Titan landing in 2005, crossing northern equinox in August 2009, and completing its Prime and Equinox Missions. It is now three years into its 7-year Solstice mission, returning science in a previously unobserved seasonal phase between equinox and solstice. As it watches the approach of northern summer, long-dark regions throughout the system become sunlit, allowing Cassini's science instruments to probe as-yet unsolved mysteries.

Key Cassini-Huygens discoveries include icy jets of material streaming from tiny Enceladus' south pole, lakes of liquid hydrocarbons and methane rain on giant Titan, three-dimensional structures in Saturn's rings, and curtain-like aurorae flickering over Saturn's poles. The Huygens probe sent back amazing images of Titan's surface, and made detailed measurements of the atmospheric composition, structure and winds. Key Cassini-Huygens science highlights will be presented.

The Solstice Mission continues to provide new science. First, the Cassini spacecraft observes seasonally and temporally dependent processes on Saturn, Titan, Enceladus and other icy satellites, and within the rings and magnetosphere. Second, it addresses new questions that have arisen during the mission thus far, for example providing qualitatively new measurements of Enceladus and Titan that could not be accommodated in the earlier mission phases. Third, it will conduct a close-in mission at Saturn yielding fundamental knowledge about the interior of Saturn. This grand finale of the mission occurs in 2017, when a series of 22 inclined orbits sends Cassini between the innermost D ring and the upper portions of Saturn's atmosphere, enabling unique gravity and magnetic field measurements of the planet, unprecedented determination of the ring mass, some of the highest resolution measurements of the rings and Saturn, and in situ observations in a completely new region around the planet.

Cassini-Huygens is a cooperative undertaking by NASA, the European Space Agency (ESA), and the Italian space agency (Agenzia Spaziale Italiana, ASI).

This work was carried out in part at the Jet Propulsion Laboratory, California Institute of Technology, under contract with NASA. Copyright 2014 California Institute of Technology. Government sponsorship is acknowledged.