NASA Facts

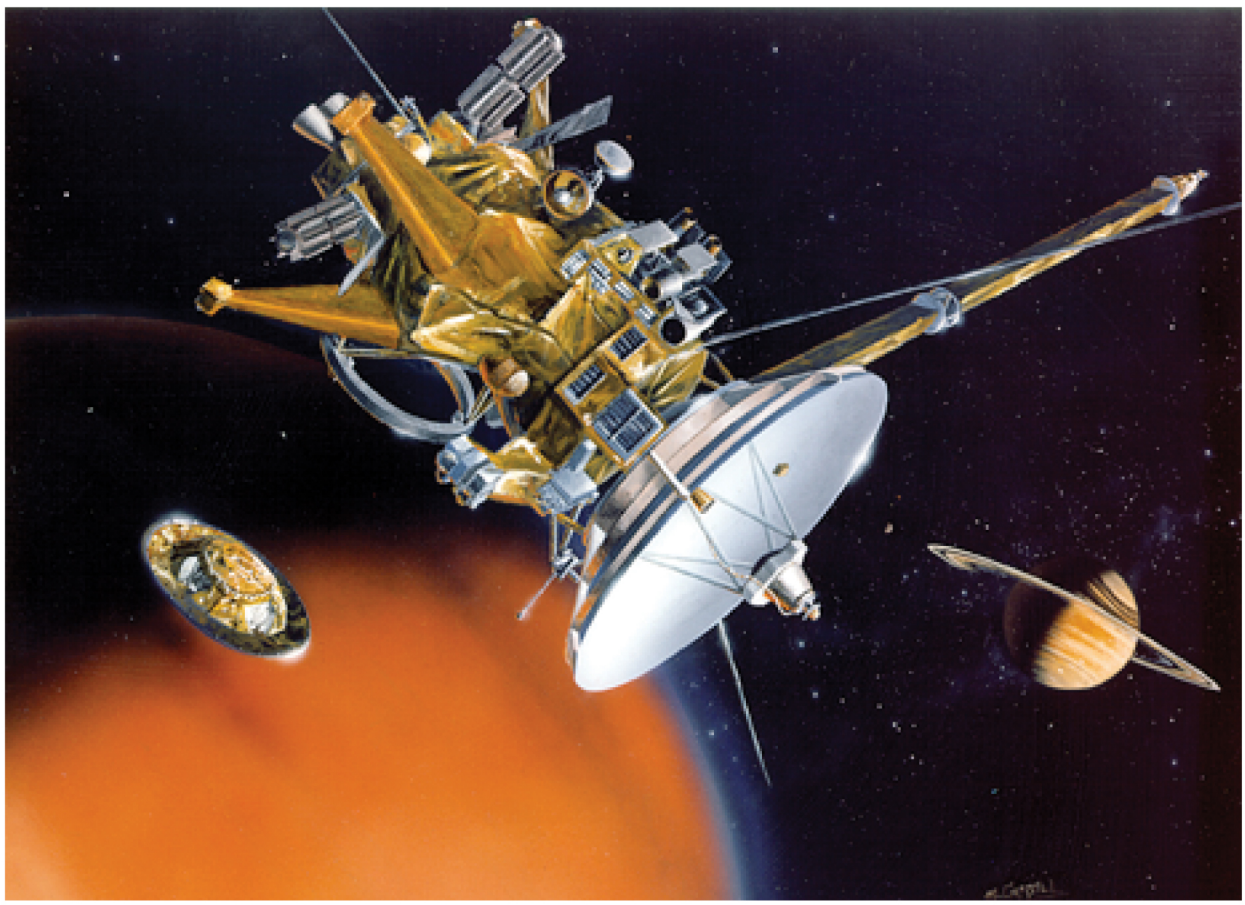
National Aeronautics and
Space Administration

Ames Research Center
Moffett Field, California 94035-1000

NF-2004-01-001-ARC

The Cassini-Huygens Mission
The Role of NASA Ames Research Center

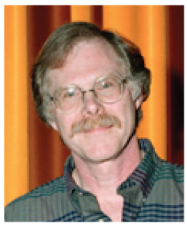
NASA Ames Research Center is playing an important role in the Cassini-Huygens mission, with scientists involved in the mission's ring, surface and atmospheric science operations. Ames also was instrumental in laying early groundwork for the mission, beginning with concept proposals and probe entry science in the 1970s.



This artist's conception of the Cassini orbiter shows the Huygens probe separating to enter Titan's atmosphere. After separation, the probe drifts for about three weeks until reaching its destination, Titan. Equipped with a variety of scientific sensors, the Huygens probe will spend 2-2.5 hours descending through Titan's dense, murky atmosphere of nitrogen and carbon-based molecules, beaming its findings to the distant Cassini orbiter overhead. The probe should continue to relay information for up to 30 minutes after it lands on Titan's frigid surface, after which the orbiter passes beneath the horizon as seen from the probe.

SCIENCE OPERATIONS

Four NASA Ames researchers are currently involved in the Cassini mission.



Dr. Jeff Cuzzi: Cassini Interdisciplinary Scientist and Ring Scientist

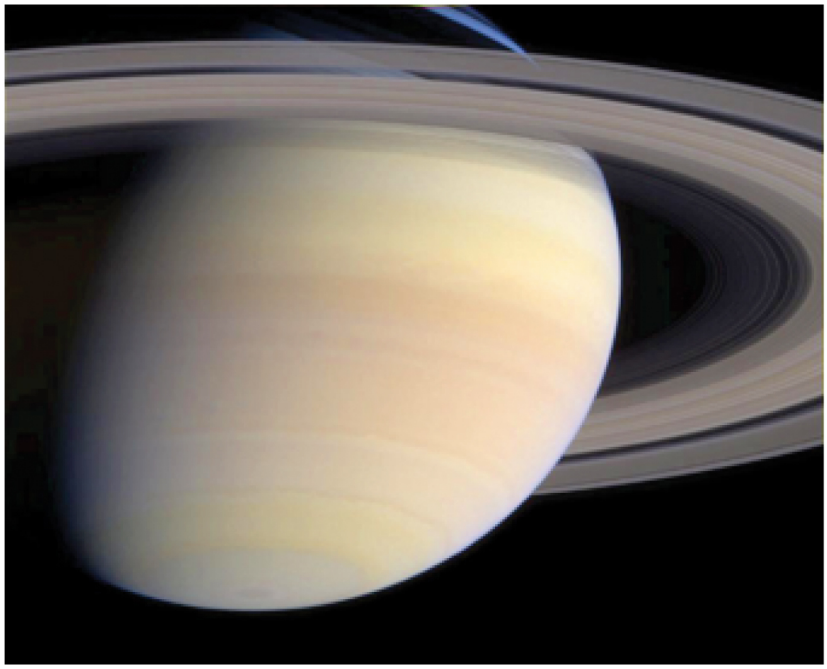
Cuzzi was appointed to the mission to address broad ring science issues. He works primarily with the imaging (ISS), infrared reflectance spectrometer (VIMS), thermal emission spectrometer (CIRS), and ultraviolet stellar occultation (UVIS) teams, but his interests span nearly all Cassini teams. He is focusing on the color, composition and origin of Saturn's rings, including the role of meteoroid bombardment.

Cuzzi also led several Cassini ring particle hazard assessment studies, which supported planning the initial ring plane crossings during the Saturn Orbital Insertion (SOI) phase of the mission in June 2004.

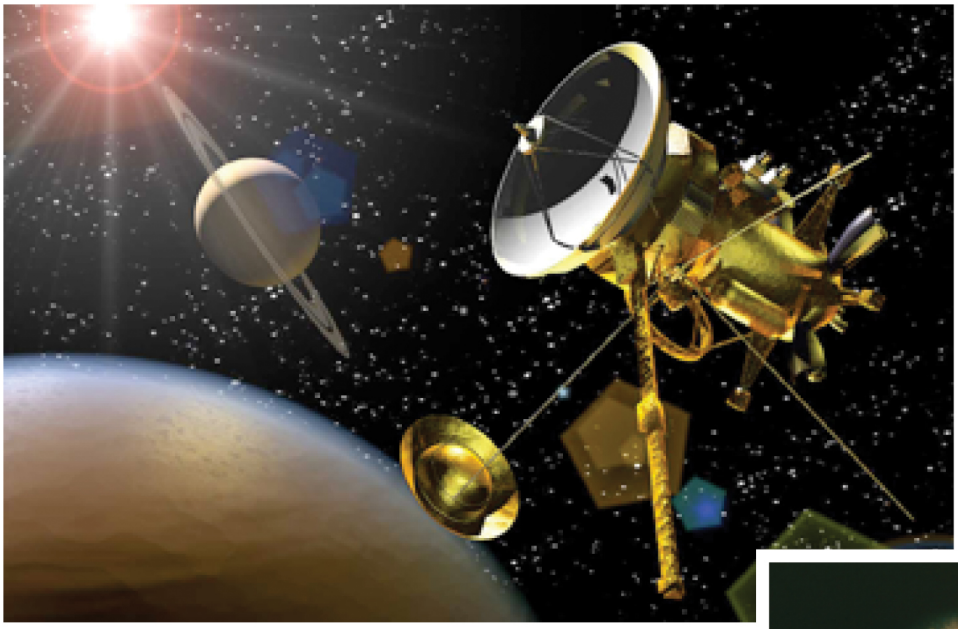
This is a narrow angle field-of-view artist's rendering from the bottom of a large ice crevasse on the surface of Phoebe, the least known of all the saturnian satellites.
Image credit: David Seal

Dr. Dale Cruikshank: Co-Investigator, 'VIMS' Satellite Surface Composition Research Scientist

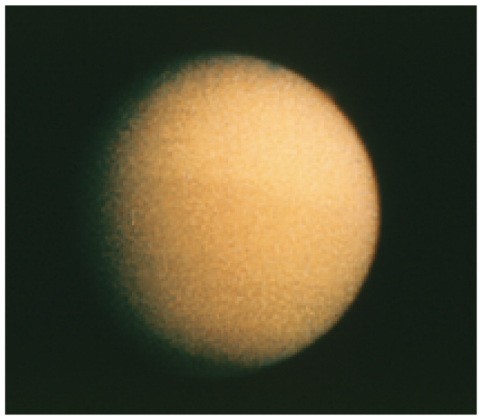
Cruikshank will use infrared spectrometer mapping data from the flyby of Saturn's moon, Phoebe, in June 2004 to determine the moon's surface composition. Cassini will fly approximately 1,241 miles (1,997 kilometers) from Phoebe's surface during the flyby. A specialist in the small bodies of the outer solar system, he also will use VIMS data to study the icy organic surfaces of all of Saturn's other icy moons.



This image offers a preview of the detailed survey Cassini will conduct of the planet's dazzling rings. Slight differences in color denote both differences in ring particle composition and light-scattering properties.
Image credit: NASA/JPL/Space Science Institute



(left) This artist's rendition shows the Huygens probe at the start of its 22-day coast phase toward Titan. Huygens will be the first probe to land on a world in the outer solar system.
Image credit: Steven Hobbs



(above) This image of Titan, taken by a Voyager spacecraft, shows Titan to be completely shrouded by a thick atmosphere. The atmosphere is about 95% nitrogen, the remainder methane as well as other hydrocarbons and hydrogen cyanide.

Dr. Chris McKay: Co-Investigator, Huygens Atmospheric Structure Instrument (HASI)

McKay will study the atmospheric properties of Saturn's moon, Titan, using data from HASI as the probe descends through Titan's atmosphere in January 2005.

Dr. William Borucki: Co-Investigator, Huygens Atmospheric Structure Instrument (HASI)

Borucki will study the electrical charging and conductivity of Titan's atmosphere, measured by HASI during the probe's descent. Calculations indicate that Titan's atmospheric electrical charges are so conductive that lightning there is unlikely.

(right) The Huygens probe descends through Titan's murky, brownish-orange atmosphere of nitrogen and carbon-based molecules, beaming its findings to the distant Cassini orbiter. The probe is equipped with a variety of scientific sensors to measure the physical properties of the moon's atmosphere; it also carries an imaging device to return pictures of Titan's possibly hydrocarbon-lake-dotted surface. *Image credit: The European Space Agency*

NASA AMES' ROLE 1970s–1990s

Starting in the 1970s, NASA Ames played an important role in laying the groundwork for Cassini, with Titan probe entry science definition work. This led to a series of initial NASA Ames engineering studies and probe concept proposals. NASA Ames scientists also were involved in nuclear safety assessment studies and the development of information technology (IT) visualization tools for the mission.

1970s

• Capitalizing on its leadership in the Galileo probe mission and Pioneer Venus mission, and with encouragement from Dr. Dale Compton, division chief for space science, Ames conceived and led the first advanced studies of Titan entry probe missions in the late 1970s. These studies conceived of Titan as an astrobiological target of opportunity. Engineering leads included Jim Murphy and Bryon Swenson.

1980s

• In the early 1980s, Ames presented to NASA Headquarters a suite of concepts for Pioneer class missions to the outer and inner planets, under the leadership of Dr. Larry Colin, chief of the Space Science Division at NASA Ames. Among these were probe missions to Saturn, Uranus and Neptune. This suite of small, focused missions presaged what became a NASA-wide emphasis on "faster, better, cheaper" missions by more than a decade.

• Jim Pollack was appointed interdisciplinary scientist for Cassini's Origin and Evolution team. Pollack, an early adviser in the planning of Titan probe missions, died in 1994.

• NASA Ames 'Hall of Famer' Dr. Al Seiff and Ames engineer Bryon Swenson provided early guidance to NASA and the European Space Agency (ESA) in Titan probe entry science and technology. When NASA and ESA joined forces to mount an orbiter-probe mission to Saturn and Titan, Cuzzi supported the partnership as a member of the joint NASA-ESA Cassini science working group.

1990s

• 1995: NASA Ames IT experts collaborated with Cassini mission planners in early studies of complex sequence optimization. This work led to ongoing NASA Ames collaboration in Mars rover scheduling (for the Mars Exploration Rover mission), and the development of visualization tools, which are being used by several Cassini teams.

• NASA Ames engineers, including Al Covington, took part in supporting the multi-agency nuclear safety assessment related to using plutonium-based power sources for Cassini.

Early probe prototype about to be tested in the Ames Neutral Buoyancy Facility.
Image credit: Eric James

MISSION MANAGEMENT

The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. The Jet Propulsion Laboratory, a division of the California Institute of Technology in Pasadena, Calif., manages the Cassini-Huygens mission for NASA's Office of Space Science, Washington, D.C. JPL designed, developed and assembled the Cassini orbiter.

MORE INFORMATION

Please visit: *http://saturn.jpl.nasa.gov/*