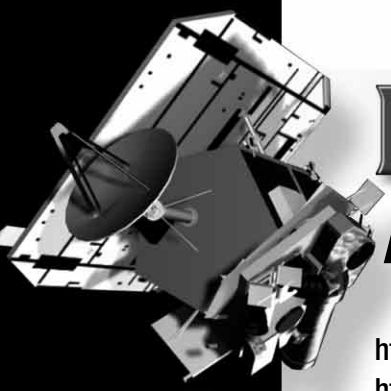


DEEP IMPACT

FIRST LOOK INSIDE A COMET!

http://deepimpact.jpl.nasa.gov
http://deepimpact.umd.edu

What's deep inside a comet?

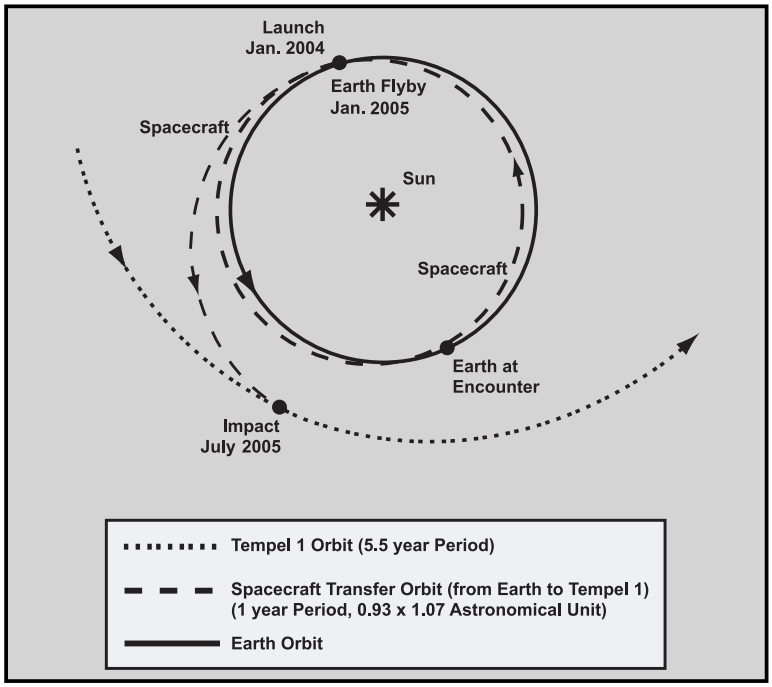
Comets are time capsules that hold clues about the formation and evolution of the solar system. They are composed of ice, gas and dust, which is the primitive debris from the solar system's earliest and coldest formation period – 4.5 billion years ago. Deep Impact, a NASA Discovery Mission, will be the first space mission to probe beneath the surface of a comet and reveal the secrets of its interior.

On July 4, 2005, the Deep Impact spacecraft will arrive at Comet Tempel 1 and impact it with a 350-kg (770-lbs) mass, producing a football field-sized crater, seven stories deep. Ice and dust debris will be ejected from the crater revealing the fresh material beneath. Sunlight reflecting off the ejected material will provide a dramatic brightening that will fade slowly as the debris dissipates into space or falls back onto the comet. Spacecraft cameras will send images back to Earth of the approach, the impact and its aftermath. The collision between the comet and the impactor will also be observable from certain locations on Earth and in some cases with smaller telescopes. Images from the mission will be analyzed and will contribute to the knowledge gained by other NASA and international comet missions to better understand the solar system's formation and the implications of comets colliding with Earth.

The Mission

The Deep Impact mission will last six years from start to finish. Planning from November1999 through early 2001 will be followed by design, building and testing of a two-part spacecraft. The larger "flyby" spacecraft will carry a smaller "impactor" spacecraft to Tempel 1 and release it into the comet's path for a planned collision.

In January 2004, a Delta II rocket will launch the combined Deep Impact spacecraft. In January 2005, as it passes close to Earth, the combined spacecraft will test and calibrate its scientific instruments and then be redirected toward the comet. The combined spacecraft will approach Tempel 1 and collect images of the comet before the impact. In early July 2005, 24 hours before impact, the flyby spacecraft will point high-precision tracking telescopes at the comet and release the impactor on a course to hit the comet's sunlit side.

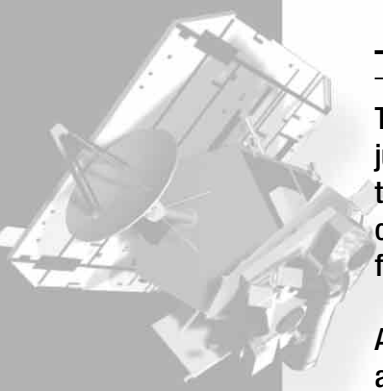


Deep Impact's orbital path to encounter Comet Tempel 1.

National Aeronautics and Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

JPL 400-936 2/01



The Mission (continued)

The impactor is a battery-powered spacecraft that will operate independently of the flyby spacecraft for just one day. It is called a "smart" impactor because, after its release, it will take over its own navigation and maneuver into the path of the comet. A camera on the impactor will capture and relay images of the comet nucleus just seconds before it collides with the comet. The comet will not be disturbed from its orbit around the Sun because the impact will not be forceful enough to change its direction.

After release of the impactor, the flyby spacecraft will maneuver to a new path that, at closest approach will pass 500 km (311 miles) from the comet. The flyby spacecraft will observe and record data about the impact, the ejected material blasted from the crater, and the structure and composition of the crater's interior. After passing through the comet's coma, the flyby spacecraft will turn to look at the comet again. The flyby spacecraft will take additional data from the other side of the nucleus and observe changes in the comet's activity. While the flyby spacecraft and impactor do their jobs, professional and amateur astronomers at large and small telescopes on Earth will observe the impact and its aftermath, and results will be broadcast over the Internet.

Comet Tempel 1

Comet Tempel 1 was discovered in 1867 by Ernst Wilhelm Leberecht Tempel. The comet has made many passages through the inner solar system orbiting the Sun approximately every 5.5 years. This makes Tempel 1 a good target to study evolutionary change in the mantle, or upper crust. Comets are visible for two reasons. First, dust driven from a comet's nucleus reflects sunlight as it travels through space. Second, certain gases in the comet's coma, stimulated by the Sun, give off light like a fluorescent bulb. Over time, a comet may become less active or even dormant. Scientists are eager to learn whether comets exhaust their supply of gas and dust to space or seal it into their interiors. They would also like to learn how a comet's interior is different from its surface. The controlled cratering experiment of this mission will provide answers to these questions.

Technical Implementation

The flyby spacecraft will carry a set of instruments and the smart impactor. Two instruments on the flyby spacecraft will observe the impact, crater and debris with optical imaging and infrared spectral mapping. The flyby spacecraft will use an X-band radio antenna (transmission at about eight gigahertz) to communicate to Earth as it also listens to the impactor on a different frequency. For most of the mission, the flyby spacecraft will communicate through the 34-meter antennae of NASA's Deep Space Network. During the short period of encounter and impact, when there is an increase in volume of data, the 70m antennae will be used. Primary data will be transmitted immediately and other data will be transmitted over the following week. The impactor spacecraft is composed mainly of copper which is not expected to appear in data from a comet's composition. For its short period of operation, the impactor will use simpler versions of the flyby spacecraft's hardware and software - and fewer backup systems.

The Team

The Deep Impact mission is a partnership among the University of Maryland (UMD), the California Institute of Technology's Jet Propulsion Laboratory (JPL) and Ball Aerospace and Technology Corp. (BATC). The scientific leadership of the mission is based at UMD. Engineers at BATC design and build the spacecraft under JPL's management. Engineers and managers at JPL control the spacecraft after launch and relay data to scientists for analysis. The entire team consists of more than 120 scientists, engineers, managers, and educators. Deep Impact is a NASA Discovery Mission, eigth in a series of low-cost, highly-focused space science investigations. Deep Impact offers an extensive outreach program in partnership with other comet and asteroid missions and institutions to benefit the public, educational and scientific communities.