



Rendezvous with a Comet

Mission Overview

In the not-too-distant future, teams of scientists are routinely using small, maneuverable space stations to venture out into Earth's "neighborhood" as part of a long-term study of small bodies in the Solar System. Primary targets include comets and asteroids, which scientists believe are the oldest, most primitive bodies in the Solar System and may preserve the earliest record of the material that formed Earth and its planetary neighbors.

During this mission, team members work as scientists and engineers headed to Rendezvous with a Comet as part of this continued study of our Solar System. These rendezvous missions are critical in helping scientists verify and better understand data collected by earlier small body missions occurring at the start of the new Millennium, such as STARDUST and its planned capture of cometary material from comet Wild-2 in 2004 and the return of that material to Earth in 2006. The actual samples provided by STARDUST established detailed baseline data on comets still used today.

The onboard astronauts, working with their counterparts in Mission Control, are tasked with sending a probe to intercept and collect new data in a well-studied short-period comet before heading on for a continued study of the asteroid Ceres, the largest known asteroid at 623 miles (1,003 km) in diameter.

Comet Encke provides an excellent target because its short period (3.3 years) has allowed it to be observed from Earth at more apparitions (or appearances) than any other comet, including the famous Comet Halley. Encke continues to puzzle scientists because even though it has been in a short-period orbit for thousands of years, the comet continues to have a high level of activity as the Sun's heat boils off its dirty ice into gases and dust. This is the first probe to rendezvous with Encke since 2003 and the fly-by of the comet-chasing CONTOUR spacecraft.

The small, maneuverable space stations used for these rendezvous missions require lots of maintenance and care, providing plenty of challenges for the crews in space and on the ground. Navigating into the correct position for probe launches – not to mention sending a probe through the material surrounding an active comet – also requires concentration and teamwork to successfully collect vital scientific information and complete the mission.



Small bodies in the Solar System are also highly unpredictable objects and have been known to surprise scientists from time to time, so crew members will also need to be alert and ready to make quick decisions.

About Comets

Comets are mysterious, distant travelers originating from the depths of our solar system and orbiting the sun in a highly elliptical path. Star gazers see comets as specters with luminous tails arching across the night sky for a month or two, and then disappearing from sight. Some comets never come back, with orbital periods of tens of thousands of years. Only approximately 184 of 878 known comets are calculated to have periodic orbits of less than 200 years long. For this reason, seeing comets like Halley's Comet, with its seventy-six year orbit, is often a once in a lifetime experience. Comets are scientifically valuable because they may be remnants of the material out of which the planets and moons formed. Comets may even contain clues about early life on Earth.



Sometimes called “dirty snowballs” comets are small, irregularly shaped lumps of rock, dust, and ice. They originate in either the Kuiper Belt, located outside Neptune's and Pluto's orbit, or in the Oort Cloud, hundreds of times farther away from Pluto extending halfway to the nearest star. Gravitational disturbances can cause a comet to go hurling toward the Sun. As a comet enters the inner solar system, heat from the Sun vaporizes the ice, forming an enormous cloud of gas and dust around the tiny comet. The closer the comet gets to the Sun, the more gas and dust blow away forming a tail that stretches out millions of kilometers. As the comet travels away from the Sun to the outer reaches of the solar system, the tail shortens and the gas cloud disappears.

The origin of the word comet comes from the Greek word for hair. Our ancestors thought comets were new stars with what looked like long, flowing hair trailing behind them. The “hairy” star suddenly appeared and moved across the night sky only to disappear again a few weeks or months later.

Our ancestors considered comets to be Portents of evil. To thwart the curse of the comet, Emperor Nero had all possible successors executed. A comet was sighted before the Battle of Hastings which was interpreted to mean King Harold would lose his throne to William, the Duke of Normandy. This came to pass. In Peru, the sighting of the comet preceded Francisco Pizarro's conquest of the Incas.

Even in the recent past, comet panic caused terror. In Chicago people sealed windows against

the poisonous tail of the comet. Others committed suicide. In Oklahoma police saved a virgin from being sacrificed by a comet cult.