

Delivering Earth's First Comet

December 28 2005

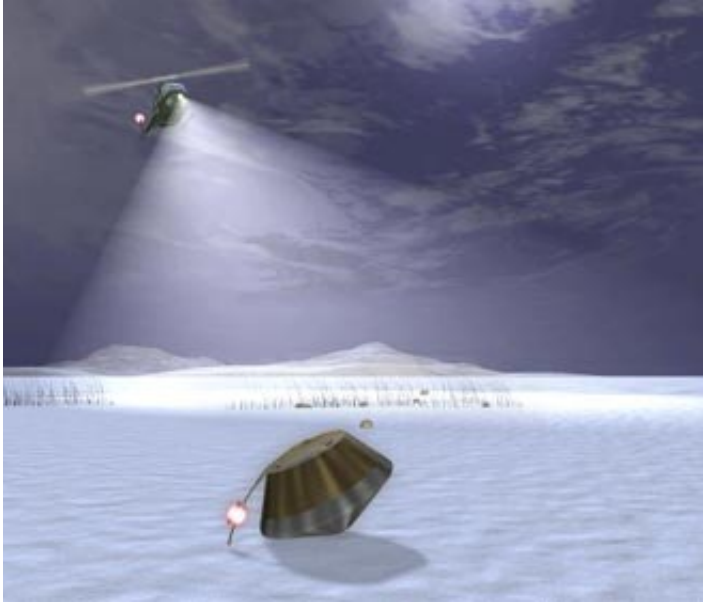


Image: Artist's concept of sample return capsule. Image credit: NASA/JPL

Stardust's voyage in space is near its end, but its cargo - the world's first cometary and interstellar dust samples - has begun its two year journey on Earth, which ends on a cold early morning on the floor of a frozen dry lakebed.

After successfully collecting particles of Comet Wild 2 on Jan. 2, 2004, Stardust's Sample Return Capsule reenters Earth's atmosphere and parachutes through the darkened sky on Jan. 15, 2006. The capsule touches down at approximately 3:15 a.m. (local time) within the Utah Test and Training Range. Upon the capsule's landing the parachute

detaches and floats to the ground several yards away.

After the capsule's touchdown, a military pilot flies a helicopter 40-60 miles across the desert lakebed toward the homing beacon emitted from the capsule. Behind the pilot's seat is the crew - a small mix of NASA engineers and contractors who make up a small part of the Sample Return Team. A second helicopter will assist and carry specialized safety personnel. They fly in formation with the deceptively simple task of retrieving the Stardust return capsule.

Flying for nearly 30 minutes, the lead helicopter's navigation indicates that the homing beacon is close. The pilot turns on a spotlight and begins sweeping the ground in order to get a visual. The spotlight catches the reflection of a small object on the desert floor and the nearby parachute stirs beneath the wind of the chopper's blades.

Both helicopters set down and seat belts are unclipped. The team gets to its feet and slowly approaches the capsule from the crosswind side and begins carrying out a series of procedures. A gas sample is taken and stored for examination, along with other samples collected from the capsule's heat shield and the surrounding desert floor. After all necessary samples are collected and all equipment gathered, the capsule is placed inside a container, loaded into one of the helicopters and flown back to a cleanroom in a nearby hanger.

Inside the cleanroom, scientists clad in "bunny suits" open the shipping container and take two more gas samples from within the unopened capsule for another examination. Then, the sound of drilling is heard as the team drills into the capsule in order to remove six bolts from the backshell, after which, the backshell is detached.

It is the first time Stardust's return capsule is opened since its encounter with comet Wild 2 took place in deep space two years earlier in 2004.

The sample canister - which looks like an oversized waffle iron and contains the sample tray with the comet and interstellar dust particles inside - is then removed from the heatshield. Several samples from the front and back of the heatshield are taken for analysis to confirm that no Earthly materials breached the canister during entry or touchdown.

Opening the Sample Return Canister

Stardust's Sample Return Canister will be opened at its curation facility at NASA's Johnson Space Center in Houston, Texas, where scientists will examine Earth's first pristine comet particles.



Scientists inspect backup aerogel collector grid. Image credit: NASA

Working in the cleanroom, scientists activate and slowly open the canister, exposing the sample tray. As a precaution, team members are prepared to catch any aerogel pieces that might have become loose during any part of Stardust's roundtrip journey across the solar system. The sample tray, which holds the aerogel and the trapped comet and

interstellar dust particles, is exposed and any loose aerogel is marked and stored.

The sample tray is then secured to a stand and individual aerogel capture cells are removed from the sample tray with a cell-removal tool. Any severely fragmented cells will be removed first to minimize further damage to the remaining cells. Each removed cell is placed in an individually marked box. Any unique features are immediately documented upon notice. The examination team first removes two cells, perform scans and then proceeds with the sample particle removal and examination.

After the preliminary examinations of several aerogel cubes, scientists proceed to work diligently on more analysis of the comet particles, employing the planned techniques of the comet and interstellar dust particle examination.

These scientists will become the world's first scientists to have pristine cometary and interstellar dust particles "in the palms of their hands." As they work, the Stardust spacecraft continues to fly through space. Its primary mission is accomplished, as it has become Earth's first cometary and interstellar dust sample return mission, which will help pioneer the future of all sample return missions.

Source: NASA (by Derek Blackway)

Citation: Delivering Earth's First Comet (2005, December 28) retrieved 25 April 2024 from <https://phys.org/news/2005-12-earth-comet.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is

provided for information purposes only.