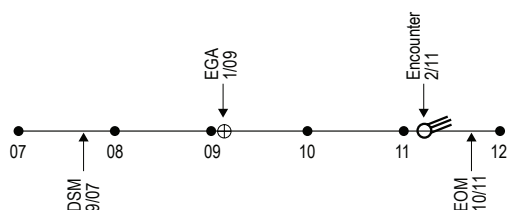


# STARDUST-NExT

## A Mission of Opportunity to Complete the Exploration of Tempel 1 with Stardust



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### About Stardust-NExT

(Stardust-**N**ew **E**xploration of **T**empel) is a low-cost, low-risk mission that uses the Stardust spacecraft to fly within 200 km of comet Tempel 1 to complete the exploration of this important comet initiated by Deep Impact. The exploration of comets has been assigned high priority by NASA because these primitive bodies preserve important clues to the early history of the solar system.

#### Stardust-NExT will

- Image the nucleus (and jets) at resolutions as high as 12 m.
- Measure the flux, size distribution, and composition of dust surrounding the nucleus.

### Important Science

**Stardust-NExT is the FIRST mission to**

- Document the surface changes on a comet nucleus between successive perihelion passages.
- Measure with identical instruments the dust properties of two comets (Wild 2 and Tempel 1).

**Stardust-NExT is the ONLY mission that can**

- Determine how the Deep Impact experiment modified the surface of Tempel 1 (e.g., crater size).
- Provide additional information on enigmatic layering and flow features discovered by Deep Impact.

### Proven Spacecraft

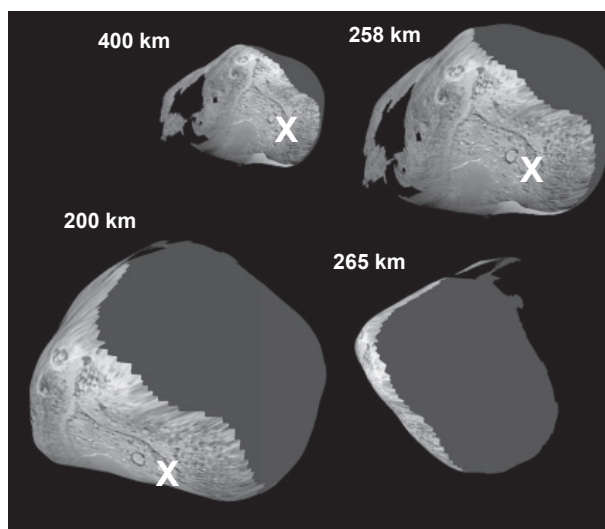
Stardust-NExT uses the Stardust spacecraft, which has completed its primary mission and remains highly functional.

### Robust Mission Profile

Following a deep space maneuver in September 2007, the spacecraft executes an Earth flyby in January 2009 and arrives at Tempel 1 on February 14, 2011.

- Mission has ample  $\Delta V$  margins
- Good downlink rates at encounter using 34-m DSN support

### What We Expect to See



X = DI impact site

■ = previously unmapped

STARDUST-NEXT: A MISSION OF OPPORTUNITY TO COMPLETE THE EXPLORATION OF TEMPEL 1 WITH STARDUST

**Capable Payload**

**Camera**

- Locates nucleus on approach.
- Images coma and dust jets near nucleus.
- Maps nucleus at high resolution.

Mass: 9.5 kg (20.9 lb)

Power: 18 watts

Supplier: Jet Propulsion Laboratory

**Comet Interstellar Dust Analyzer (CIDA)**

- Determines composition of dust surrounding nucleus.

Mass: 12.9 kg (28.4 lb)

Power: 13 watts (average)

Supplier: von Hoerner & Sulger, GmbH

**Dust Flux Monitor Instrument (DFMI)**

- Measures flux and mass of impacting dust.

Mass: 1.9 kg (4.2 lb)

Power: 1.8 watts (average)

Supplier: University of Chicago

**Supporting Ground-based Observations**

To augment the understanding of comet Tempel 1, Stardust-NExT supports a well-planned observing campaign to monitor the comet’s activity and rotation state.

**Mission Management**

**Principal Investigator**

Professor Joseph Veverka, Cornell University

**Project Management**

Jet Propulsion Laboratory,  
California Institute of Technology

**Mission Operations**

Lockheed-Martin Aerospace

**Navigation and Deep Space Network (DSN) Support**

Jet Propulsion Laboratory,  
California Institute of Technology

**Science Team**

16 Co-investigators from universities, industry, and government agencies in the U.S. and Europe, most with Stardust and Deep Impact experience

**Encounter Strategy**

The Stardust-NExT camera will detect the nucleus some 90 days before encounter:

- 60 d to 1 d before encounter: Imaging refines position of comet and monitors nucleus activity.
- Encounter ( $\pm 1$  d): Camera images nucleus surface and jets at high resolution. Dust Counter and Dust Analyzer measure flux, size distribution and composition of dust.
- 1 d to 60 d after encounter: Camera continues to monitor jet and coma activity.

**Education and Public Outreach**

The Stardust-NExT Education and Outreach program is comprehensive and designed to bring students, teachers and the public on this new voyage of discovery for the Stardust spacecraft. Stardust-NExT brings the excitement and wonder of exploring comets into homes and classrooms through educational programs, teacher and student workshops, web sites, media events, and involvement by both professional and amateur astronomers.

**Participating Scientist and Data Analysis Programs**

To infuse new talent and broader participation Stardust-NExT will support comprehensive Participating Scientist and Data Analysis programs focused on the Tempel 1 encounter.

**Cost (\$K, \$FY 06)**

WBS Element	Cost (\$K, \$FY06)
1.0 Project Management	663
3.0 Safety and Mission Assurance	179
4.0 Science and Technology	5,543
7.0 Mission Operations System	12,034
9.0 Ground Data System	1,169
11.0 Education and Public Outreach	557
12.0 Mission Design	2,377
RESERVES (5%)	1,126
<b>TOTAL MISSION COST</b>	<b>23,647</b>