

***THE NASA DISCOVERY  
STARDUST MISSION***

by

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Developed by T. Duxbury for T. Duxbury National and International Presentations

# ***STARDUST***

- ***4th NASA Discovery Project***
  - ***Mars Pathfinder, NEAR, Lunar Explorer prior Missions***
- ***1st NASA Unmanned Planetary Sample Return Mission***
- ***NASA, Univ of WA, JPL and LMA Partnership***
- ***Prof. Donald Brownlee, University of Washington, PI***
  - ***Co-I's***
    - Drs. Martha Hanner, JPL, Fred Horz, JSC,***
    - Marcia Neugebauer, JPL, Ray Newburn, Jr., JPL,***
    - Scott Sandford, ARC, Zdenek Sekanina, JPL, and***
    - Mike Zolensky, JSC***
  - ***Payload Instruments***
    - Aerogel Collector - Dr. Peter Tsou, Deputy PI - JPL, and Co-I Team***
    - CIDA - Dr. Jochen Kissel, MPI fur Kernphysik, and Team***
    - DFMI - Dr. Anthony J. Tuzzolino, U of Chicago, and Team***
    - NavCam - Facility Instrument for Co-I Team (Newburn - Lead)***
    - Radio Science - Dr. John Anderson, JPL, and Team***
    - High Rate Attitude - Dr. Benton Clark, LMA, and Team***

## ***STARDUST SCIENCE OBJECTIVES***

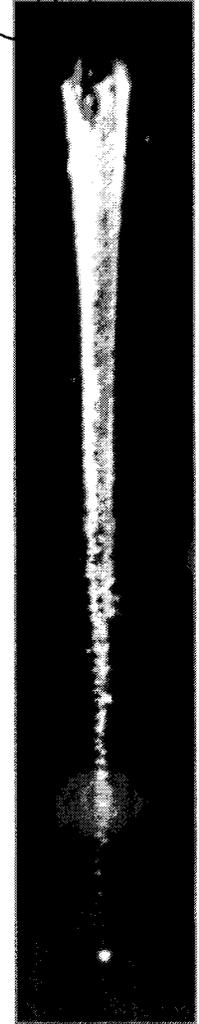
- Primary Requirement:** Collect 1000 Comet particles  $>15 \mu\text{m}$  at encounter velocity  $< 6.5 \text{ km/sec}$  and return to Earth
- Secondary Requirements:** Collect 100 Interstellar particles  $>0.1 \mu\text{m}$  and return to Earth.  
Provide  $\geq 65$  images of P/Wild 2, having a resolution of at least  $67 \mu\text{rad}$  per pixel, taken within 2000 km of the comet nucleus through selected filters;  
Provide in situ particle analysis for comet coma flythrough capable of resolving abundant elements in cometary solids
- Tertiary Requirements:** Provide in situ particle analysis for interstellar and interplanetary dust;  
Collect comet coma molecules and return to Earth;  
Measure dust mass fluence, large particles and comet mass upper limit  
Provide dust flux measurement of  $10^{-9} \text{ g}$  to  $1 \text{ g}$  particles

# AREOGEL

## Coma & Interstellar Dust Collection



To collect the particles without damaging them, STARDUST will use an extraordinary substance called aerogel - a silicon-based solid with a porous, sponge-like structure in which 99 percent of the volume is empty space. Aerogel is 1,000 times less dense than glass, another silicon-based solid. When a particle hits the aerogel, it will bury itself in the material, creating a carrot-shaped track up to 200 times its own length, as it slows down and comes to a stop - like an airplane setting down on a runway and braking to reduce its speed gradually. Since aerogel is mostly transparent - sometimes called blue smoke - scientists will use these tracks to find the tiny particles.



Images taken from STARDUST Web Site and approved for use by T. Duxbury in national and international presentations.

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Sharon C. Duxbury STARDUST Project Manager (ACT)  
5/15/00

# CIDA

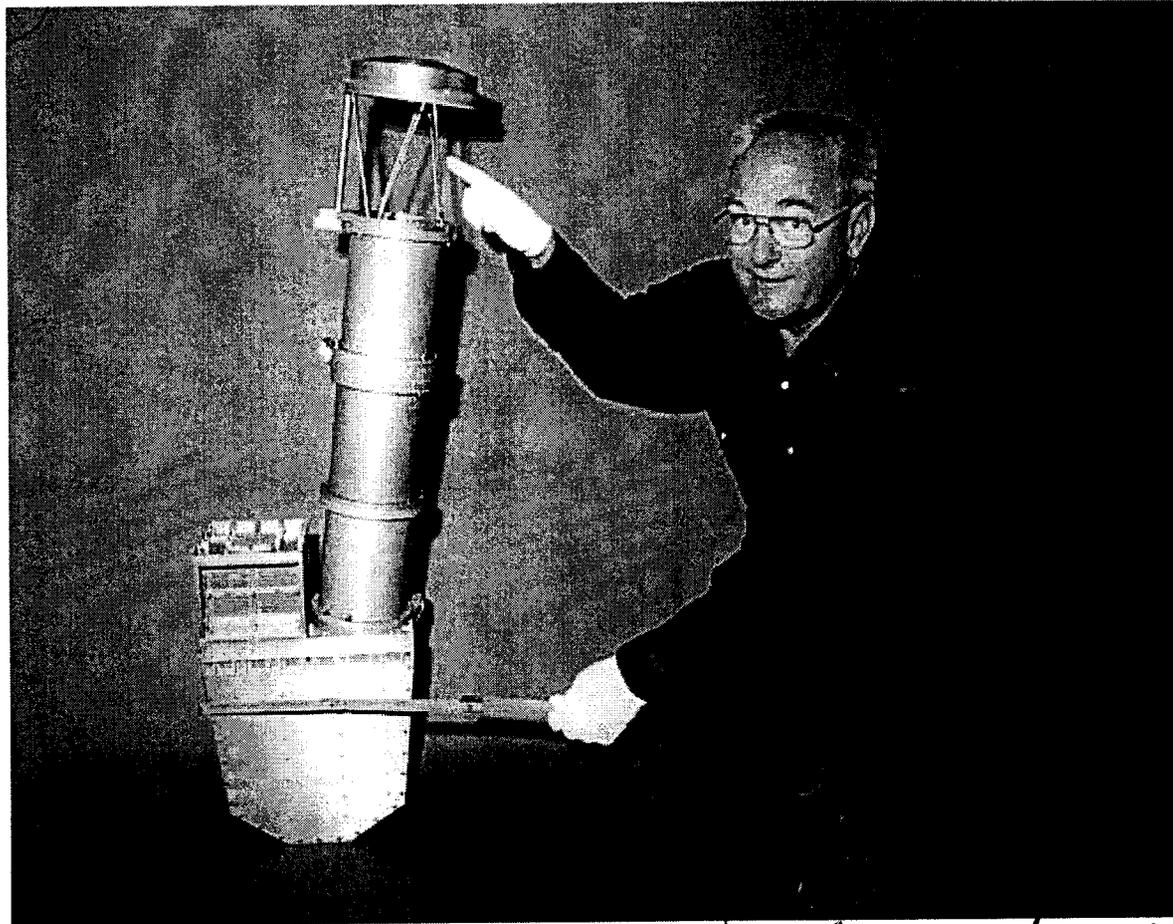
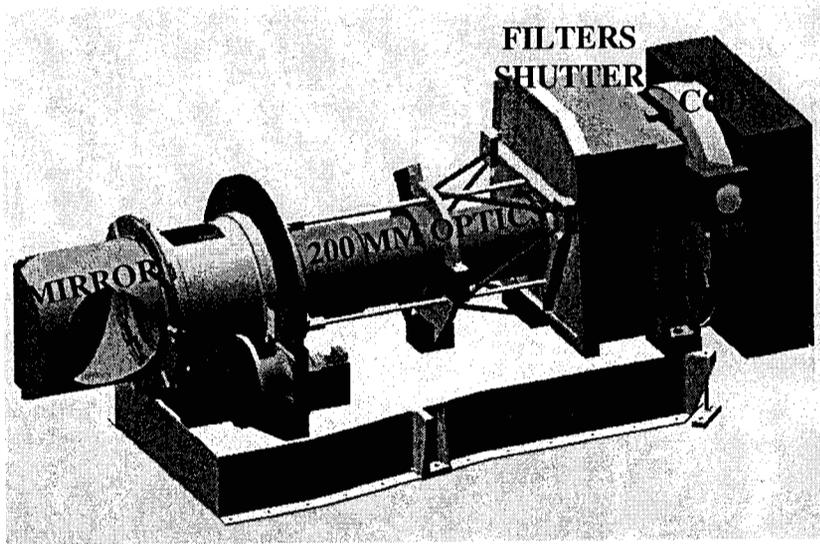


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— Thomas Duxbury STARDUST Project Manager (ACT)

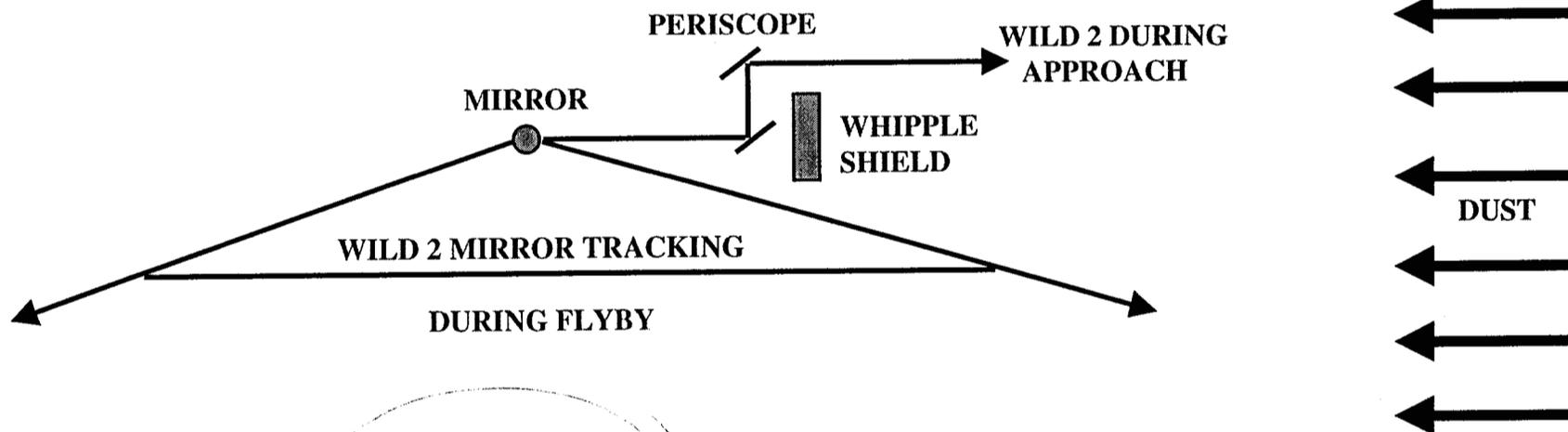
# CAMERA



## CHARACTERISTICS

- 200 mm VGR WA Optics
- 1024 x 1024 Cassini CCD
- 60  $\mu$ rad / pixel
- 1 Deg-of-freedom Mirror (200 deg)
- 8 Filters
  - 5140  $\pm$  60 C<sub>2</sub> (Blue)
  - 5800  $\pm$  20 Yellow Continuum
  - 5900  $\pm$  1000 Hi Res (Nucleus)
  - 6340  $\pm$  60 O<sup>[1]D</sup>
  - 6650  $\pm$  75 NH<sub>2</sub>
  - 7000  $\pm$  2000 Navigation
  - 7130  $\pm$  30 Red Continuum
  - 8700  $\pm$  150 Near IR

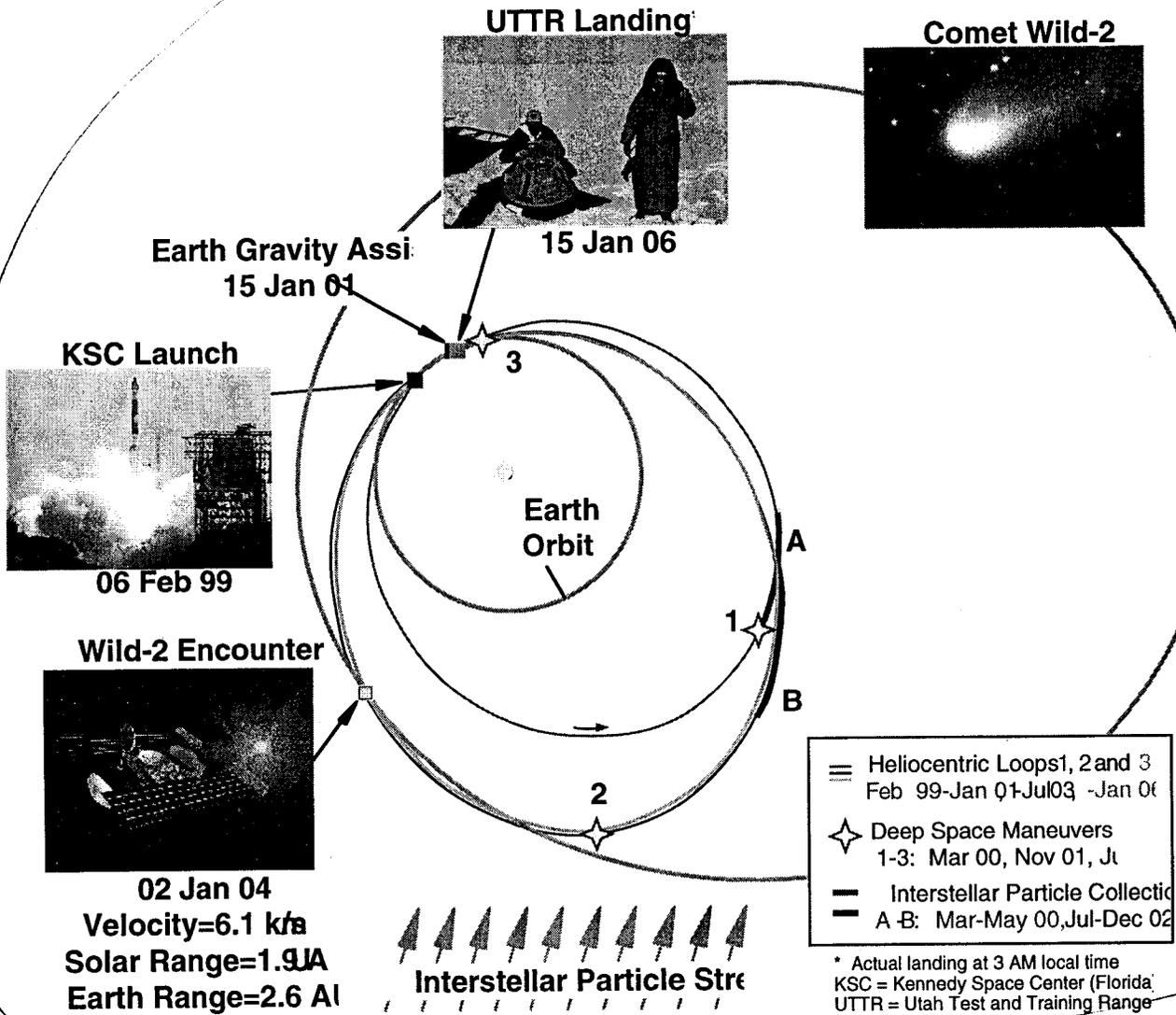
Periscope - protect optics during approach



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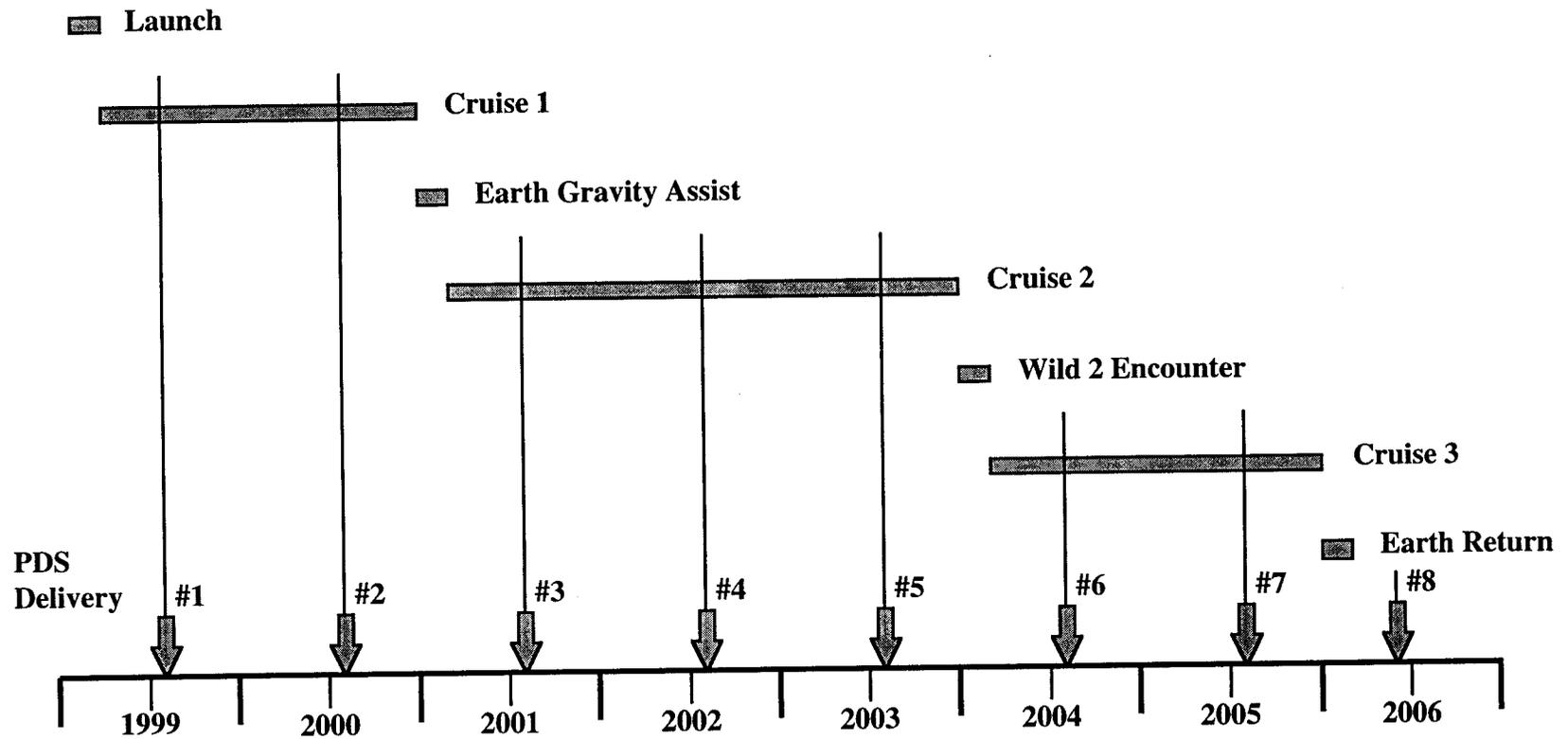
# STARDUST MISSION

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 in national and international presentations.  
 STARDUST Project Manager (ACT)

# PROJECT DATA



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