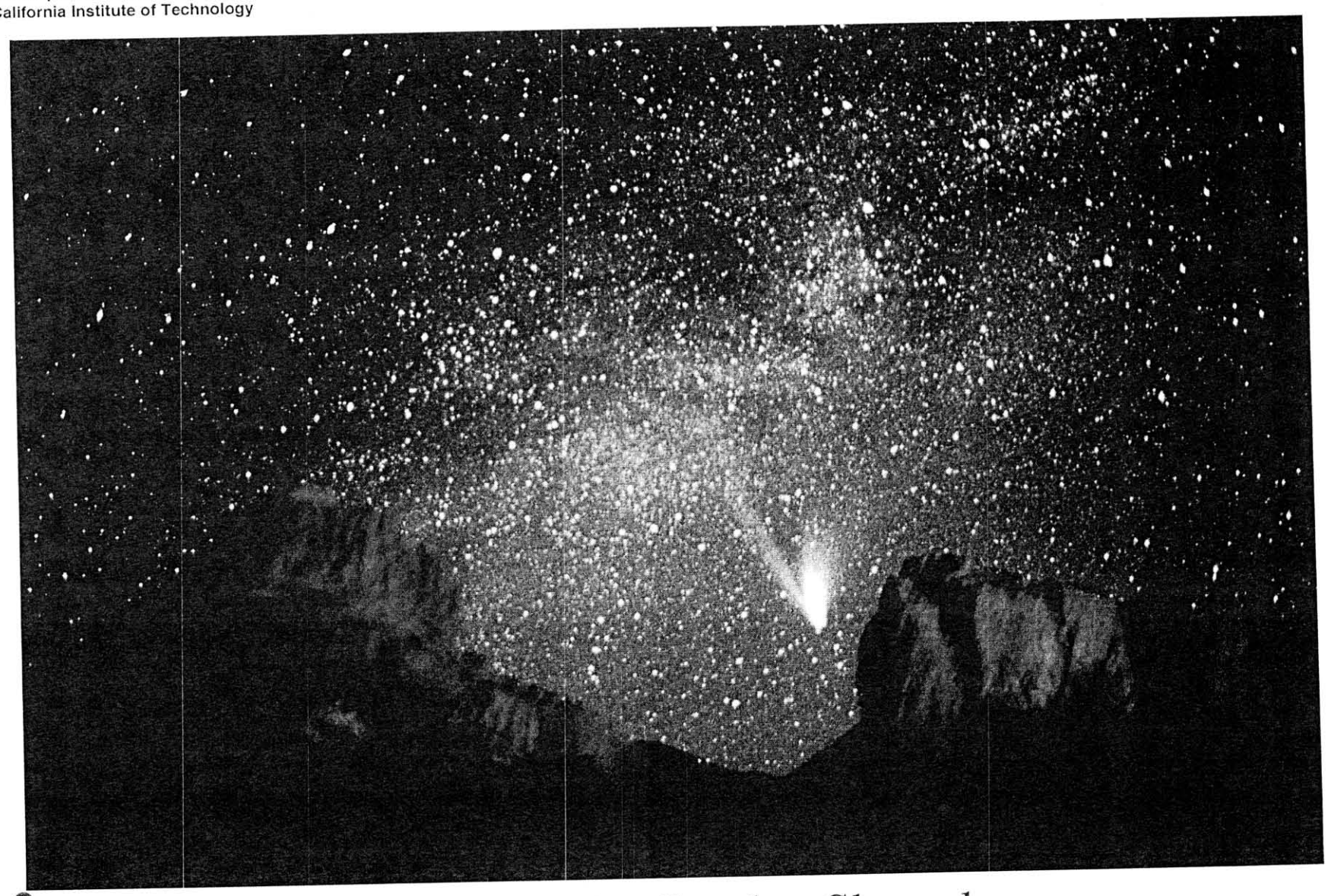
# *Analyses of the P/Wild 2 Images from STARDUST*

*Thomas C. Duxbury**
*and the STARDUST Flight Team*
**California Institute of Technology*
*Jet Propulsion Laboratory*

*35th COSPAR Scientific Assembly*
*Paris France*
*Salle 242 A*
*09:30*
*22 July 2004*

# Hyakutake by Carolyn Shumaker

T. Duxbury



Hale-Bopp by Carolyn Shumaker

# Stardust Overview

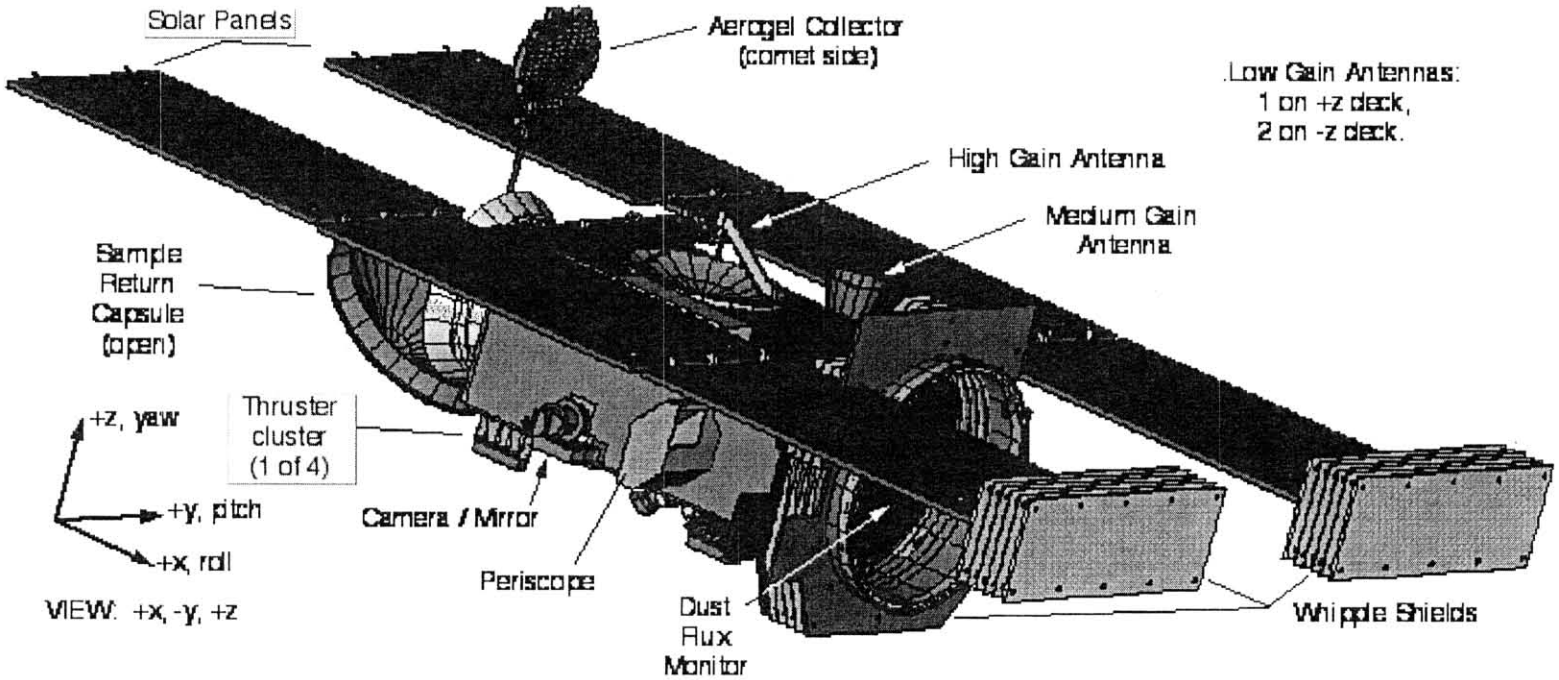
*Salient Features*

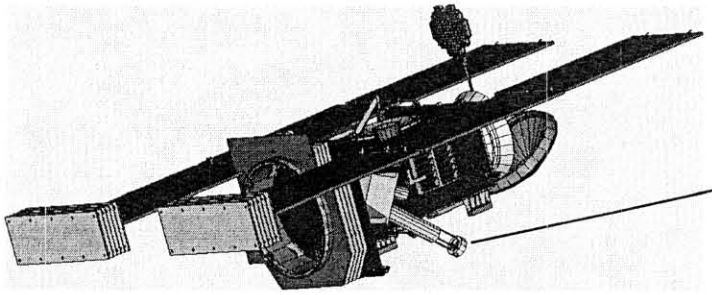
- *4TH NASA DISCOVERY PROJECT*
  - *UNIVERSITY OF WASHINGTON PI AND LMA/DENVER INDUSTRIAL PARTNER*
- *COMET SAMPLE RETURN*
- *EARTH GRAVITY ASSIST TO REACH COMET WILD 2*
- *SOLAR POWERED OUT TO 2.7 AU*
- *MOSTLY IN CRUISE MODE WITH ONE 4 HR DSN PASS/WEEK*
- *ENTRY CAPSULE AND PARACHUTES TO SOFT LAND IN THE UTAH TEST AND TRAINING RANGE*

*Science*

- *RETURN COMETAND INTERSTELLAR DUST PARTICLES USING AREOGEL/SAMPLE RETURN CAPSULE*
- *COMET WILD 2 AND LUNAR IMAGES FROM CAMERA*
- *IN-SITU MASS SPECTROMETER OBSERVATIONS OF COMETARY AND INTERSTELLAR DUST FROM CIDA*
- *WILD 2 IN-SITU DUST SIZE AND SPATIAL DISTRIBUTION OBSERVATIONS FROM DFMI*
- *INTEGRATED DUST AND NUCLEUS MASS ESTIMATE FROM RADIO SCIENCE*
- *WILD 2 DUST PARTICLE SIZE AND SPATIAL DISTRIBUTION FROM ATTITUDE RESPONSE TO PARTICLE HITS*

# Spacecraft Overview




Launch Mass: 385 kg (848 lb)
-Bus: 254 kg (560 lb)
-SRC: 46 kg (101 lb)
-Fuel: 85 kg (187 lb)

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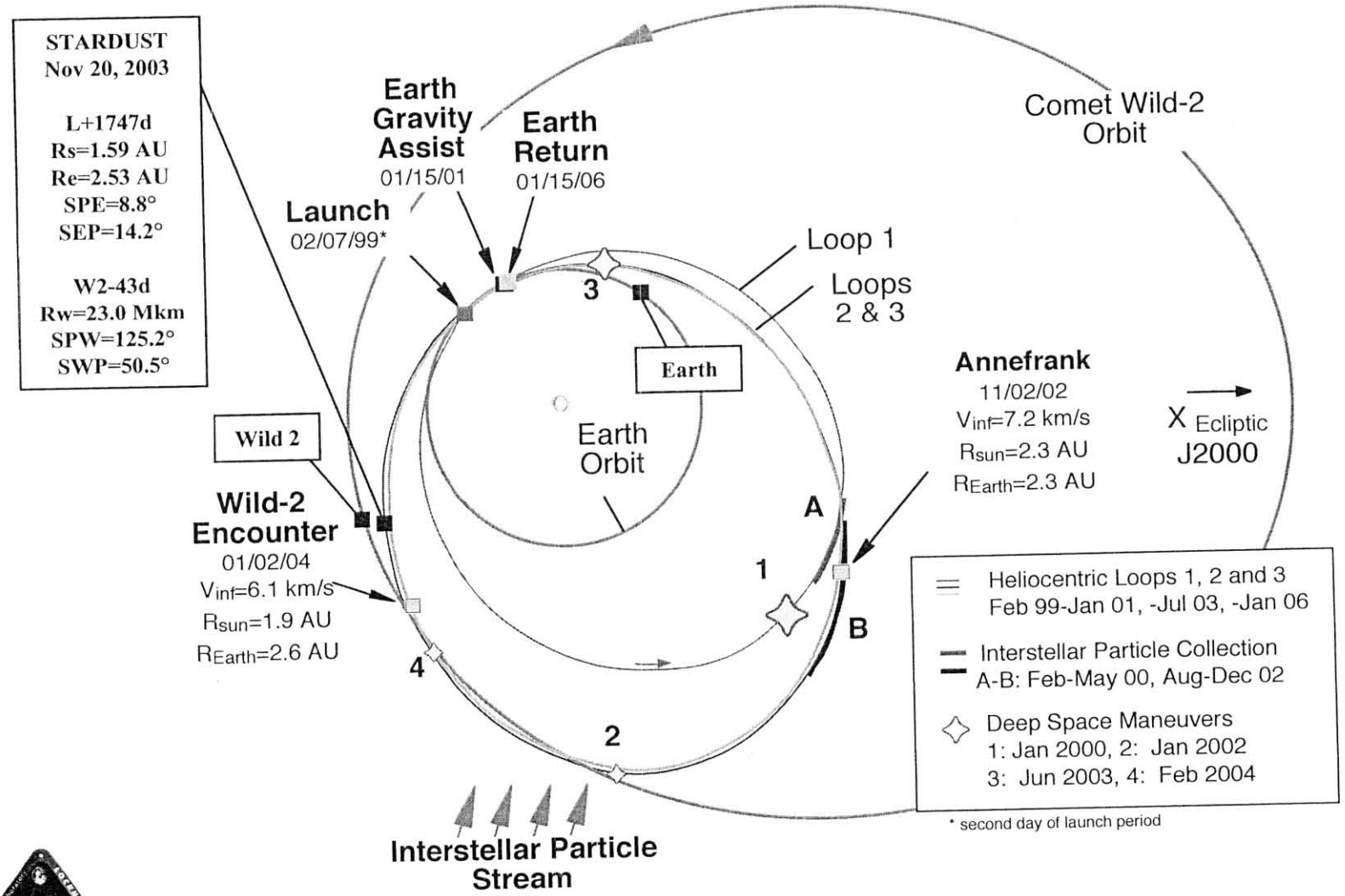
B1.2

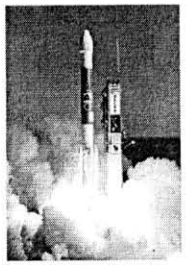
# Trajectory Overview

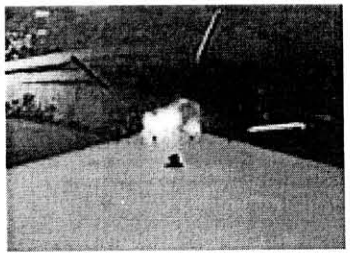


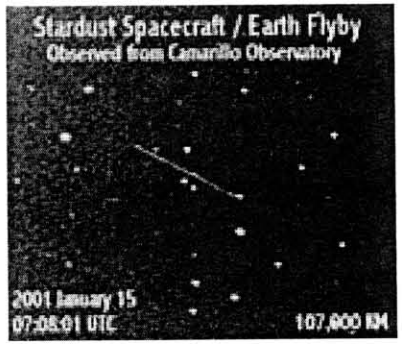

* second day of launch period

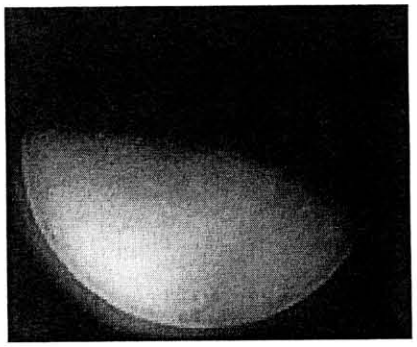
# *Project Snapshot*

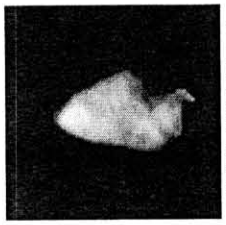
| | |
|---|---|
| Launch: | Feb 1999 |
| Deep Space Maneuver #1 | Jan 2000 |
| Interstellar Dust Collection | Feb 2000 |
| Earth Gravity Assist w/ Lunar Images | Jan 2001 |
| Deep Space Maneuver #2 @ 2.7 AU from Sun | Jan 2002 |
| Interstellar Dust Collection | Aug 2002 |
| Annefrank Encounter | Nov 2002 |
| Deep Space Maneuver #3 | Jun 2003 |
| **Wild 2 Flyby** | **Jan 2004** |
| **Earth Return** | **Jan 2006** |
| **Preliminary Sample Eval** | **Jul 2006** |
| **End of Mission** | **Sep 2006** |

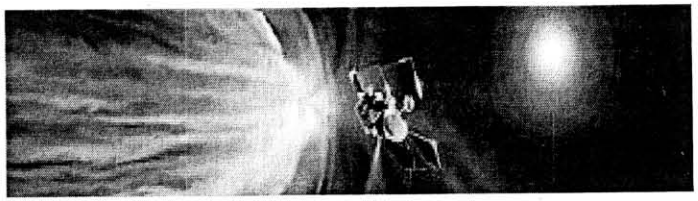


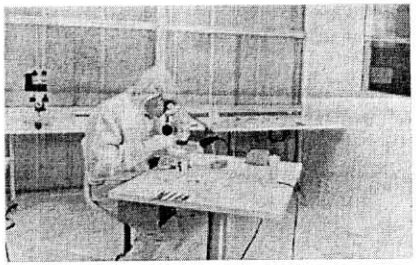




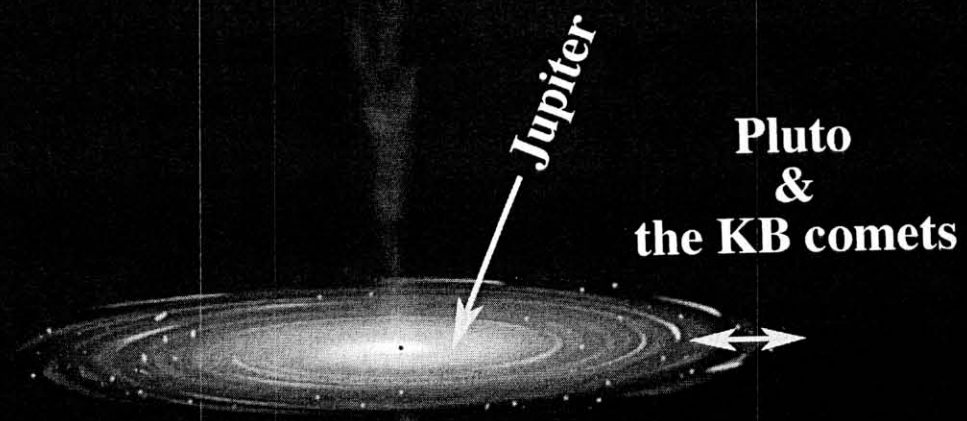









# THE SOLAR NEBULA
## 4.6 billion years ago



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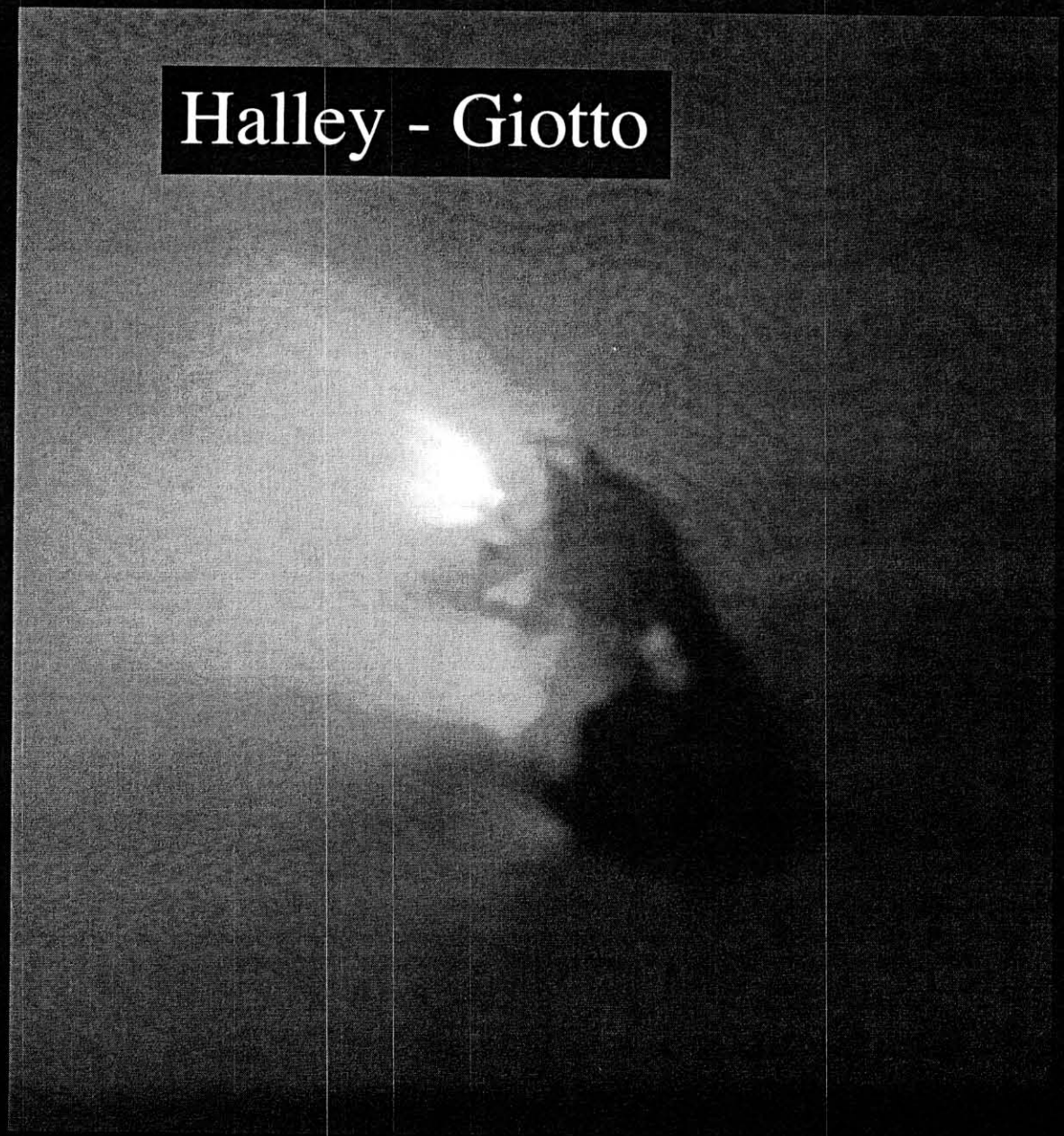
# Halley - Giotto



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LOCKHEED MARTIN

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# Borrelly - Deep Space 1

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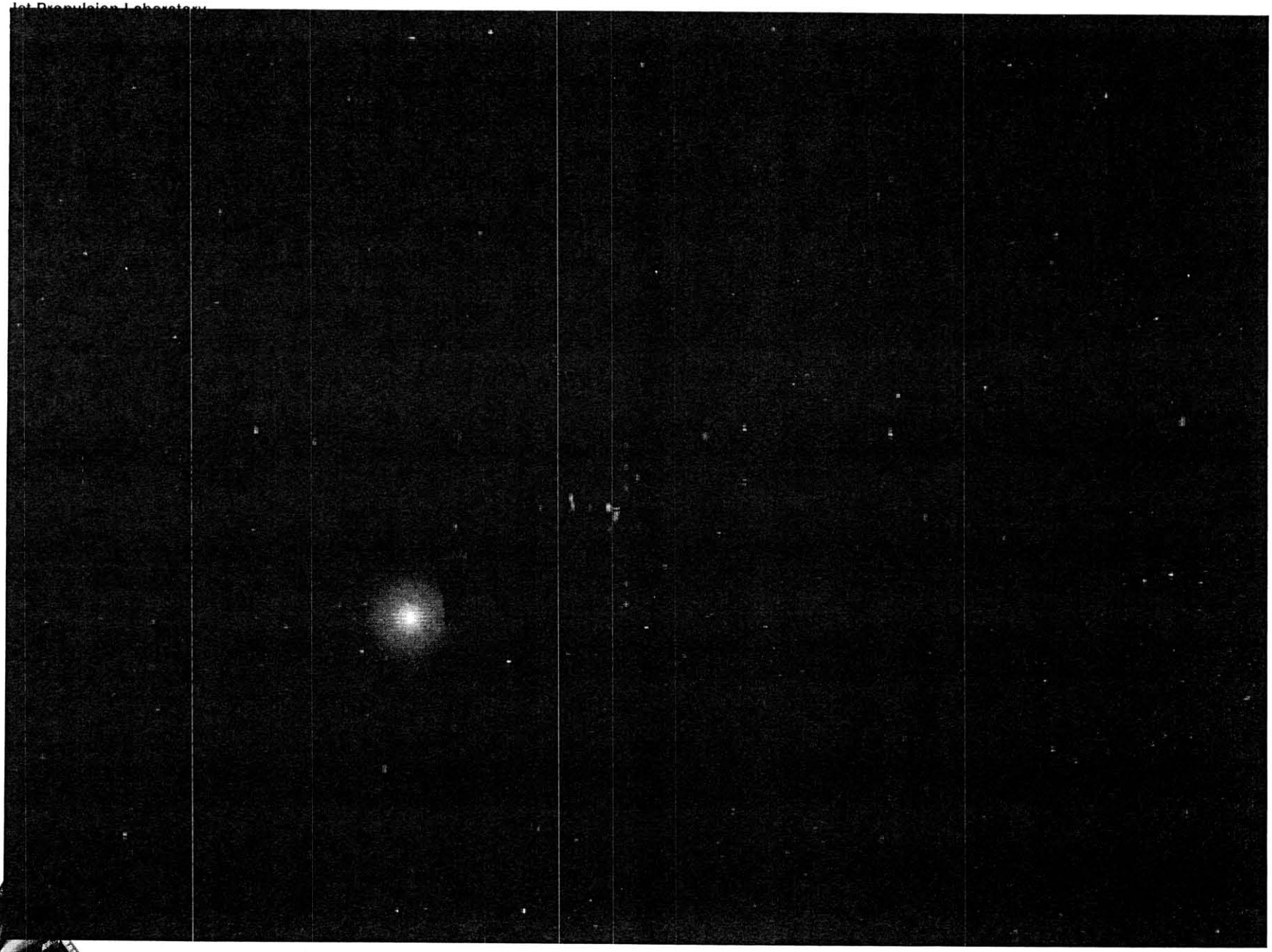

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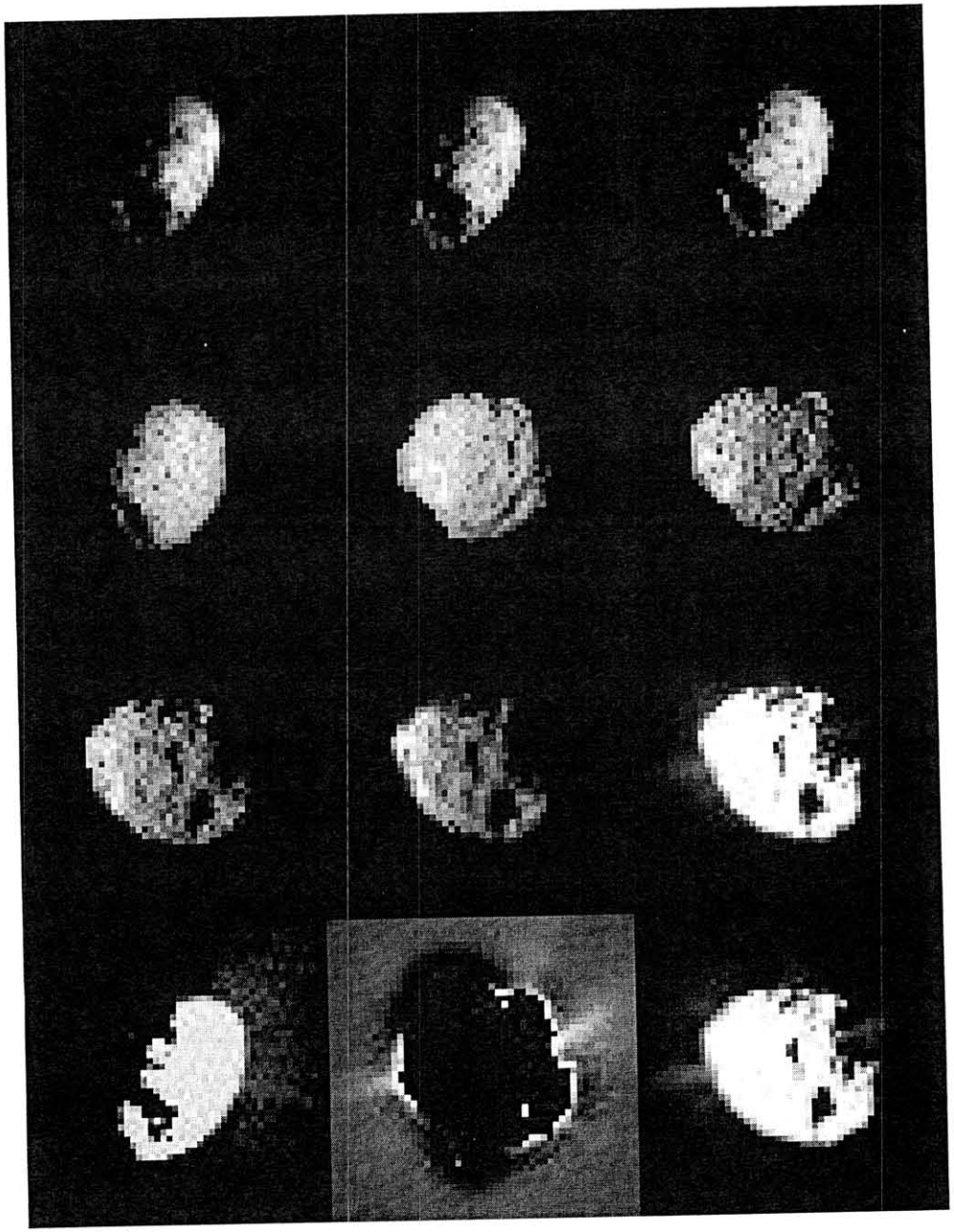

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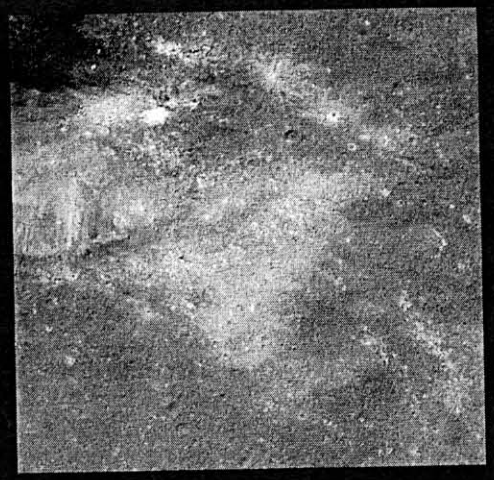
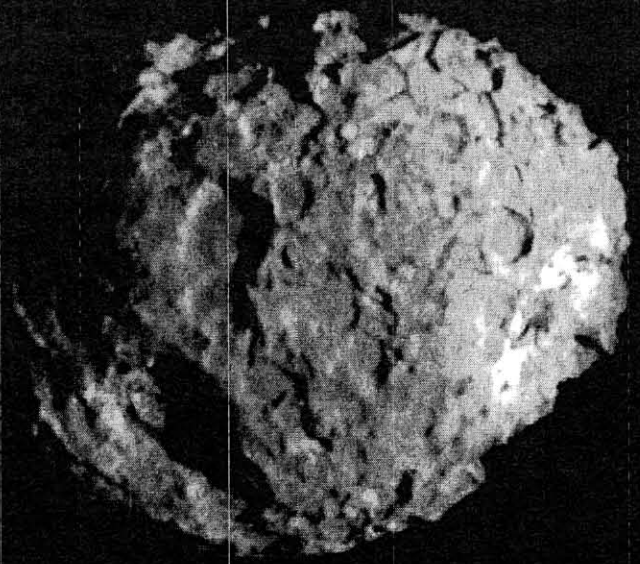
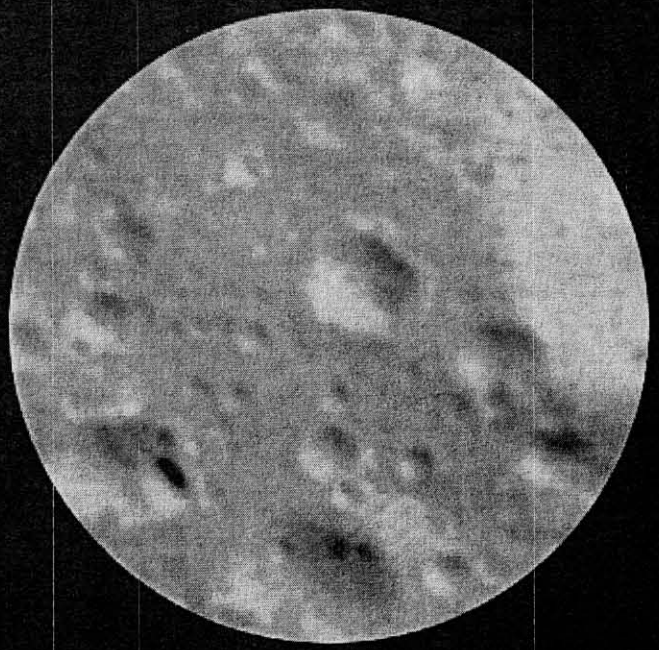
Phobos



Pheobe



Wild 2



Ida

Dactyl

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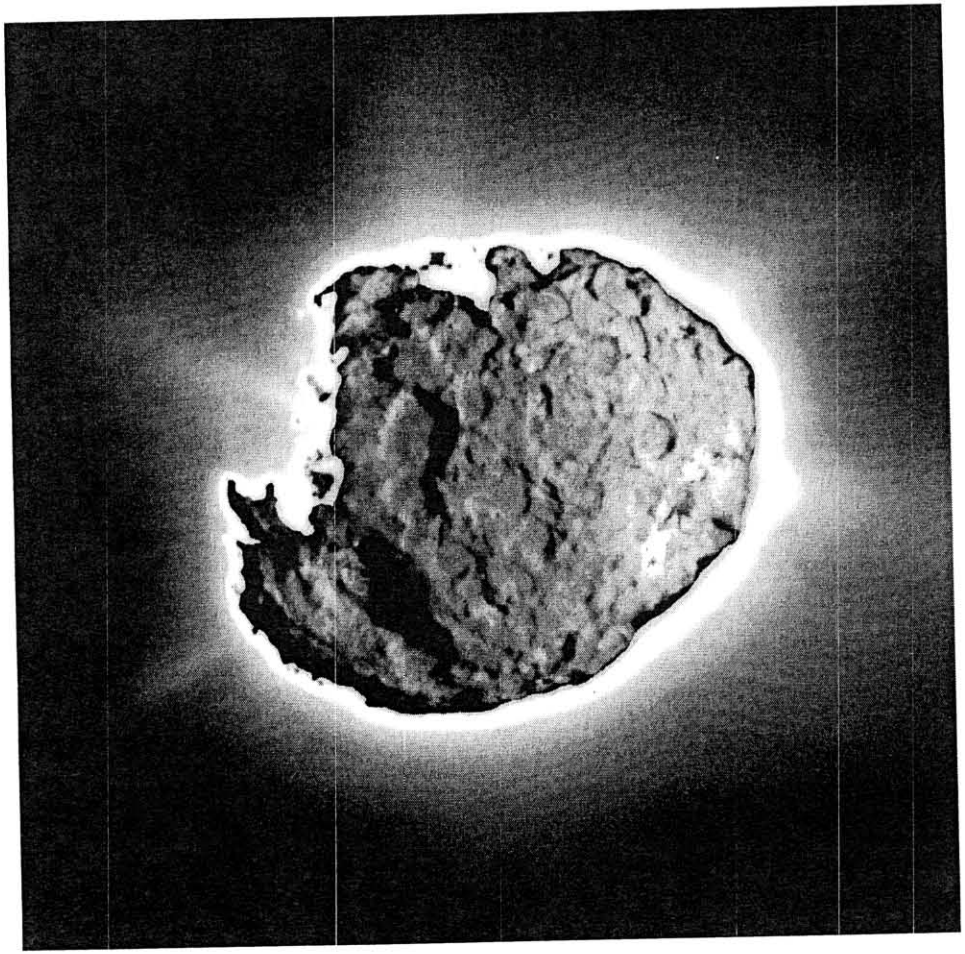
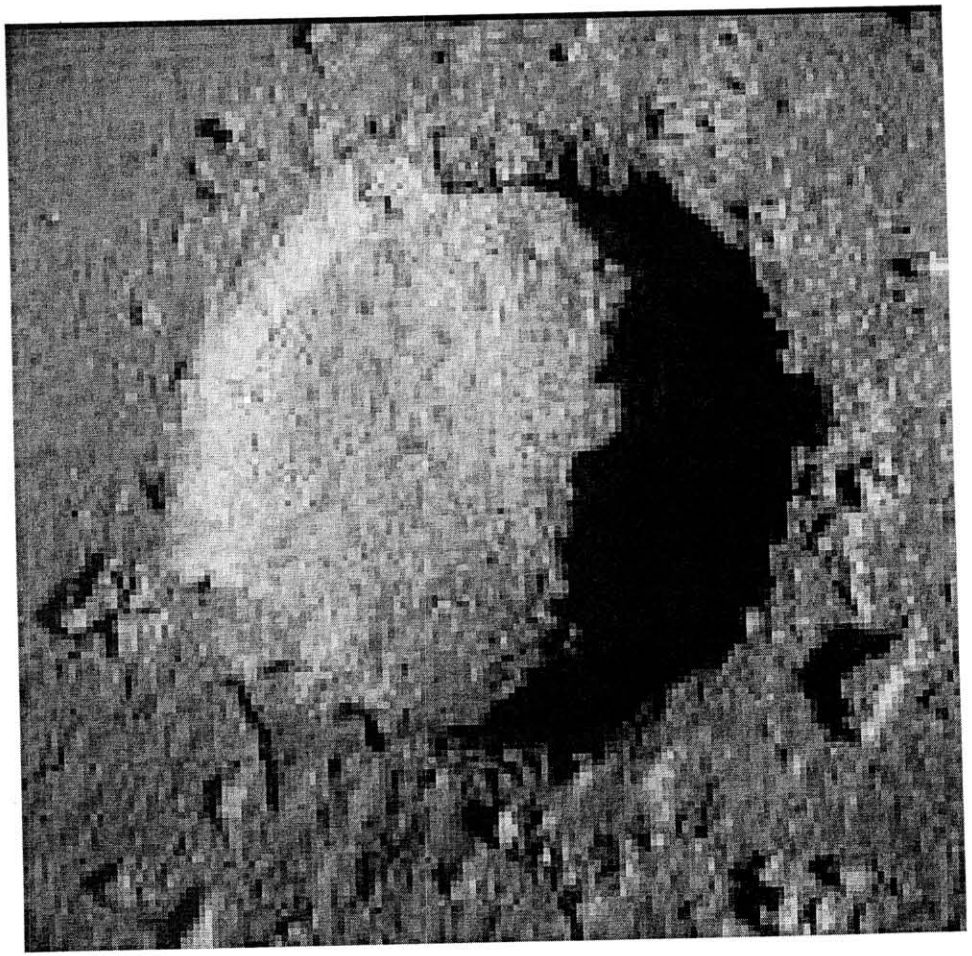
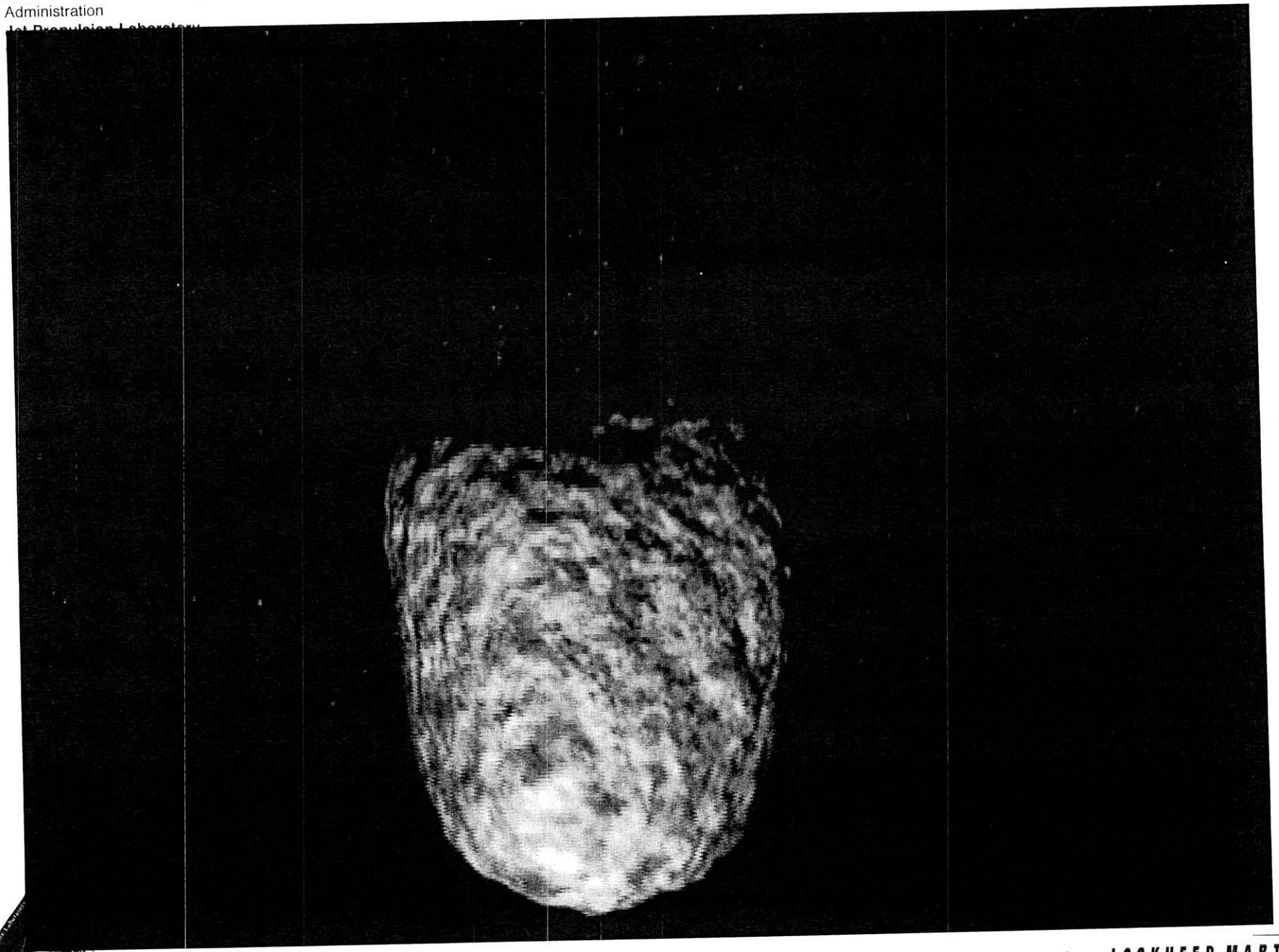
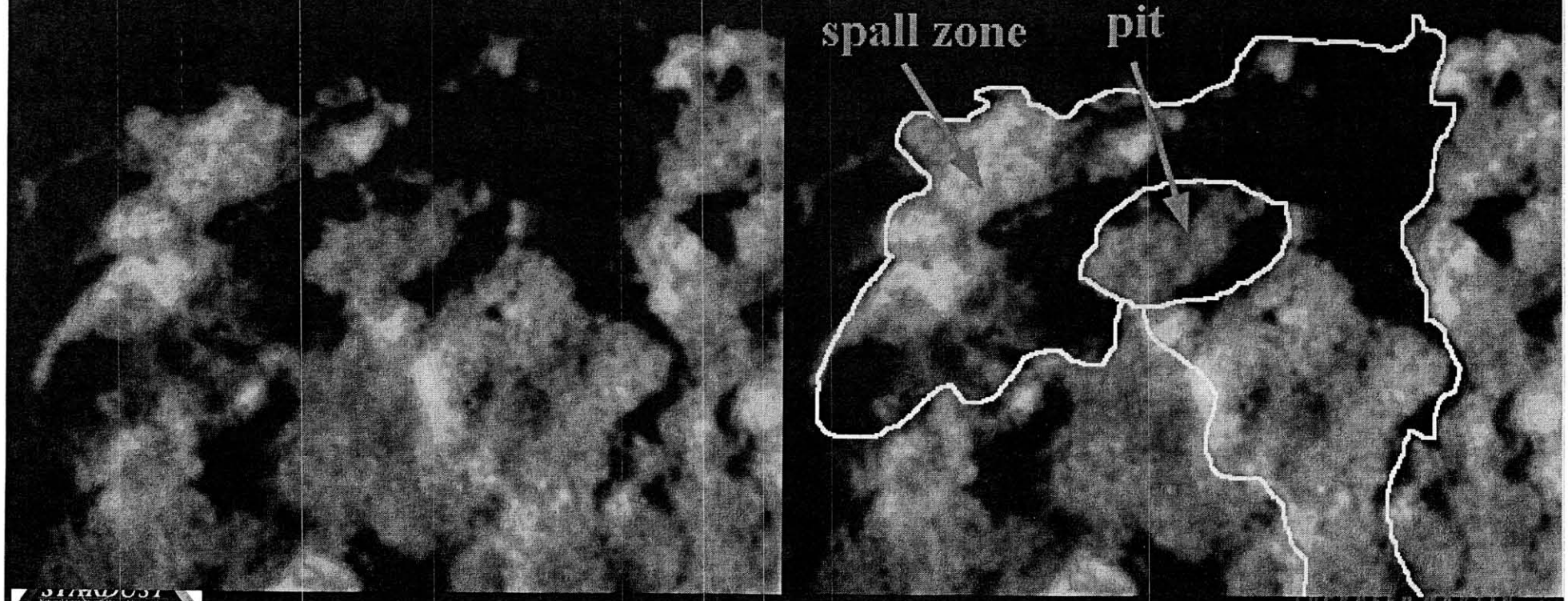






# Impact crater _ "unusual" morphology

- The pit/spall zone morphology is common for microcraters on lunar rocks (strength dominated)
- It is unheard of on larger bodies (Vesc Wild2 ~1 m/s)



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# Subtle albedo features at ~ zero phase

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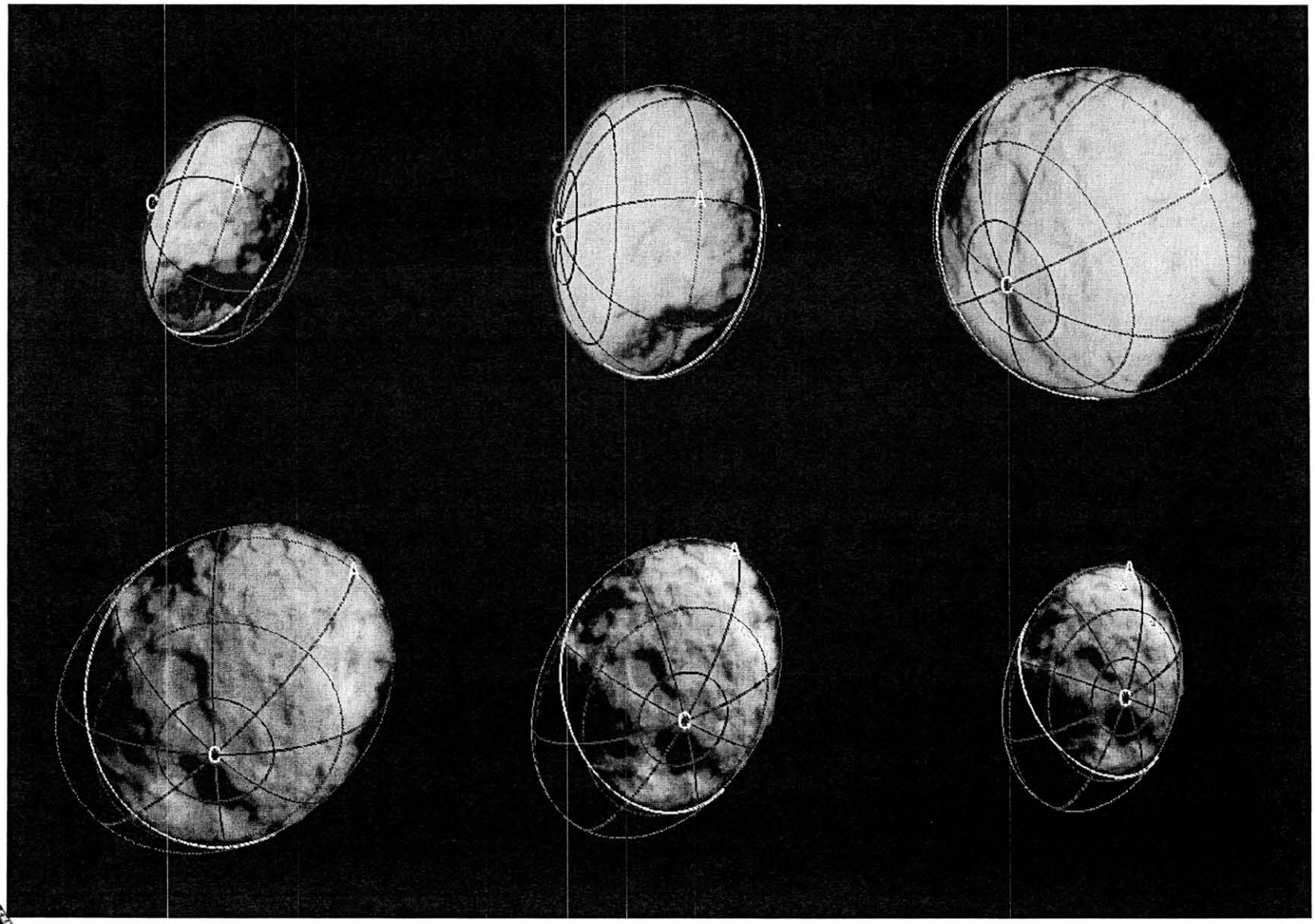
# *Size, Shape, Orientation*



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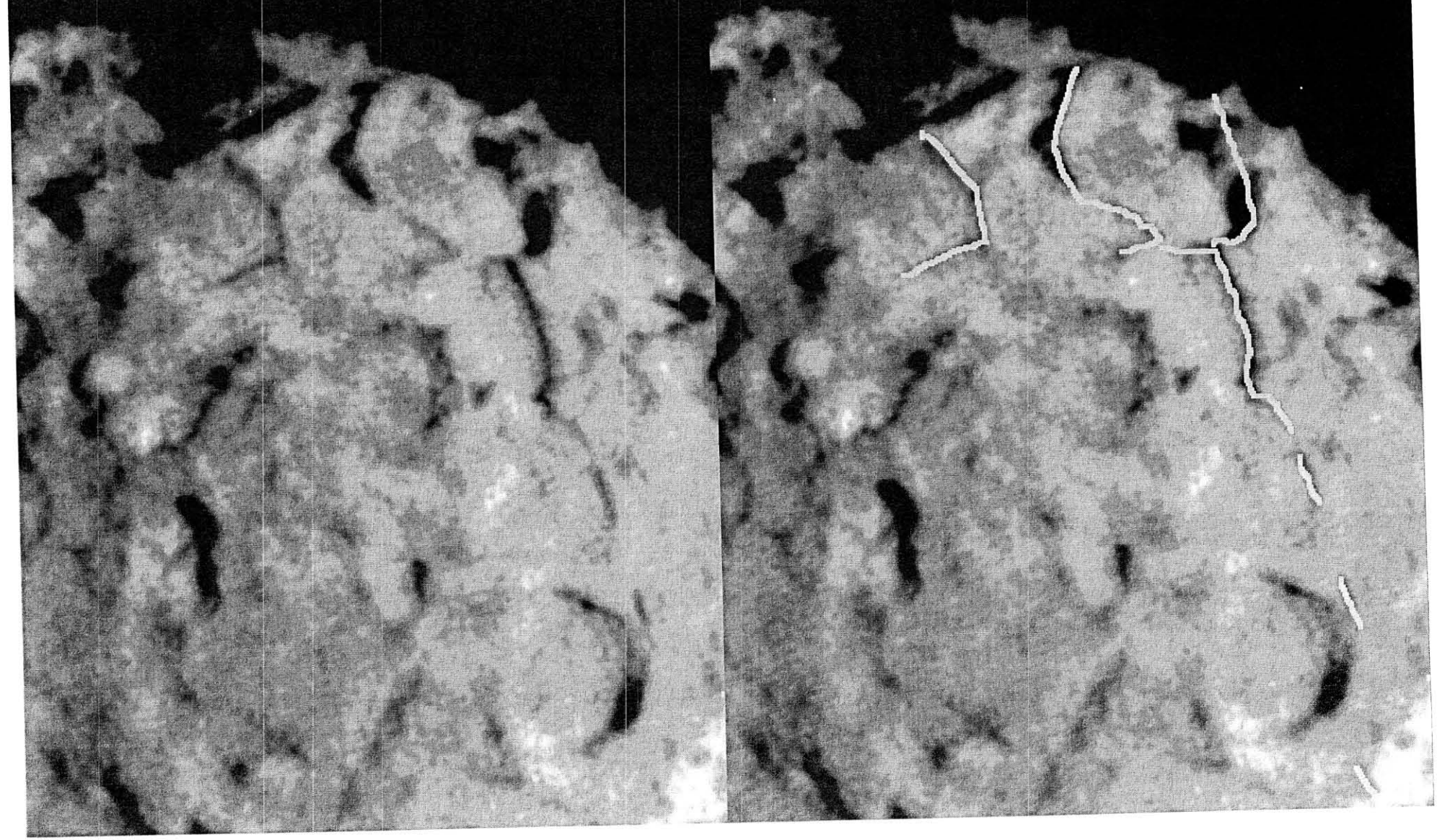
# Scarps

## Cliffs imply crust with some strength



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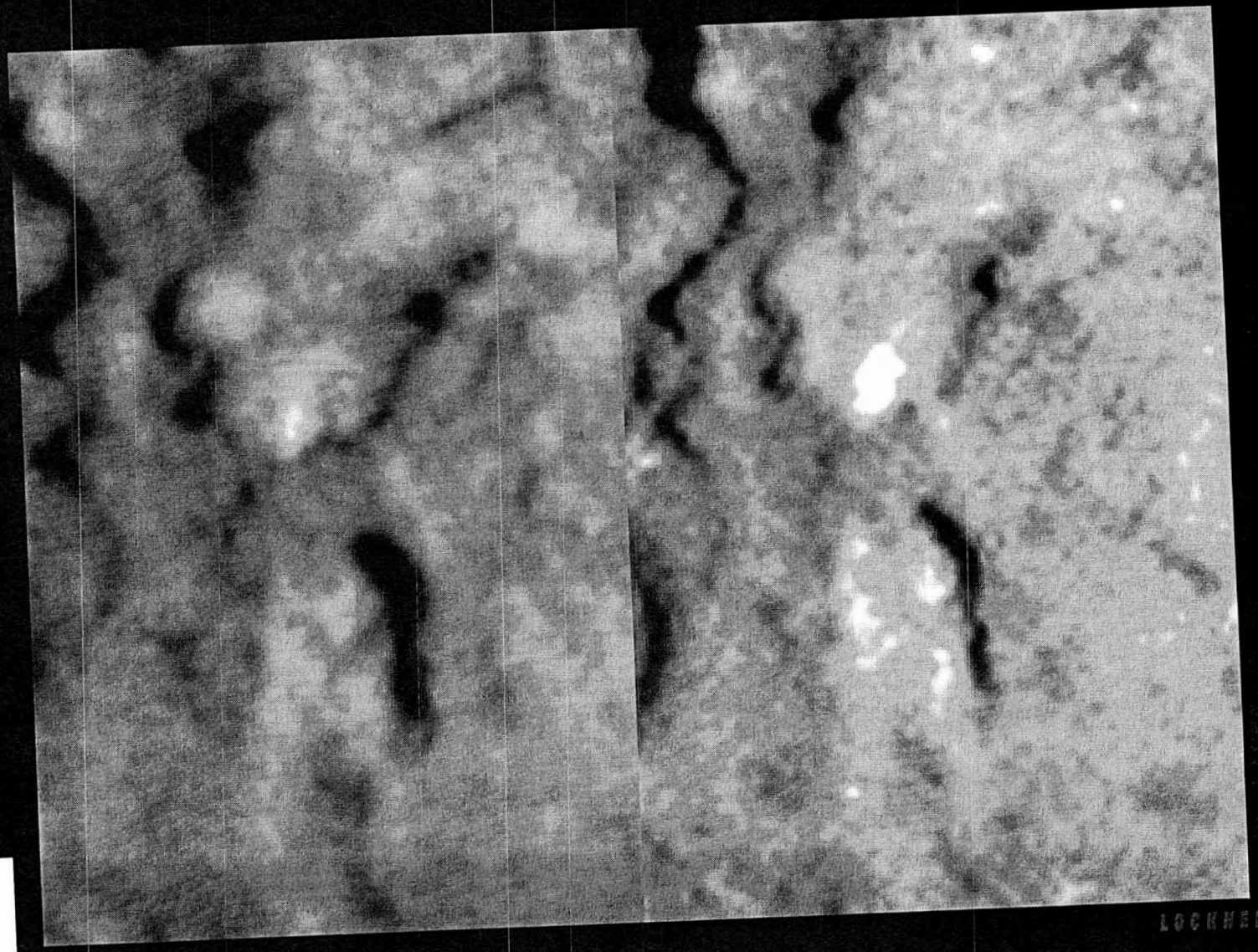
# Pits - Gas Vents? (in stereo)



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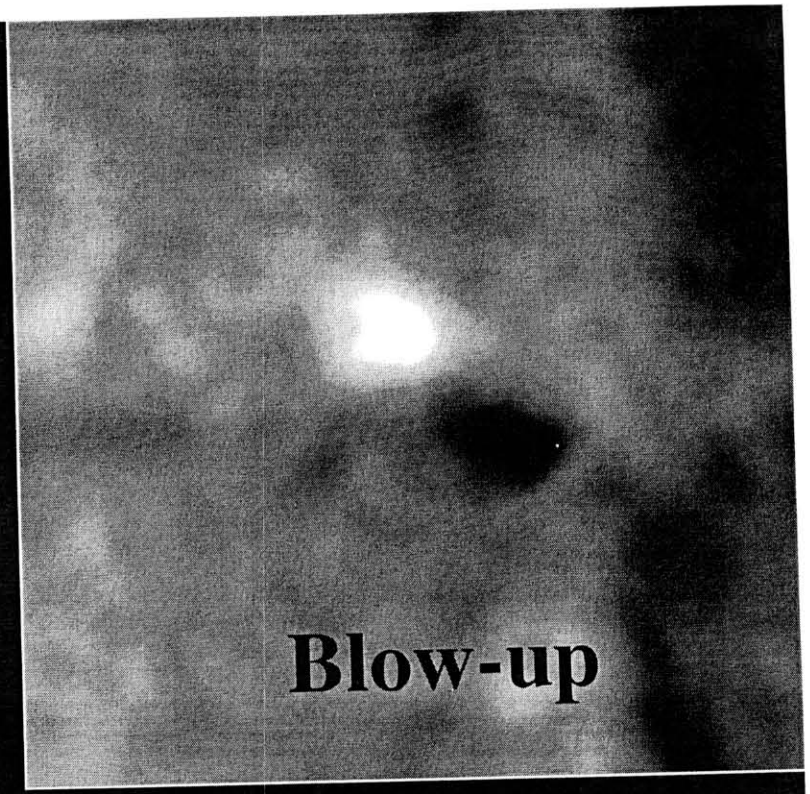
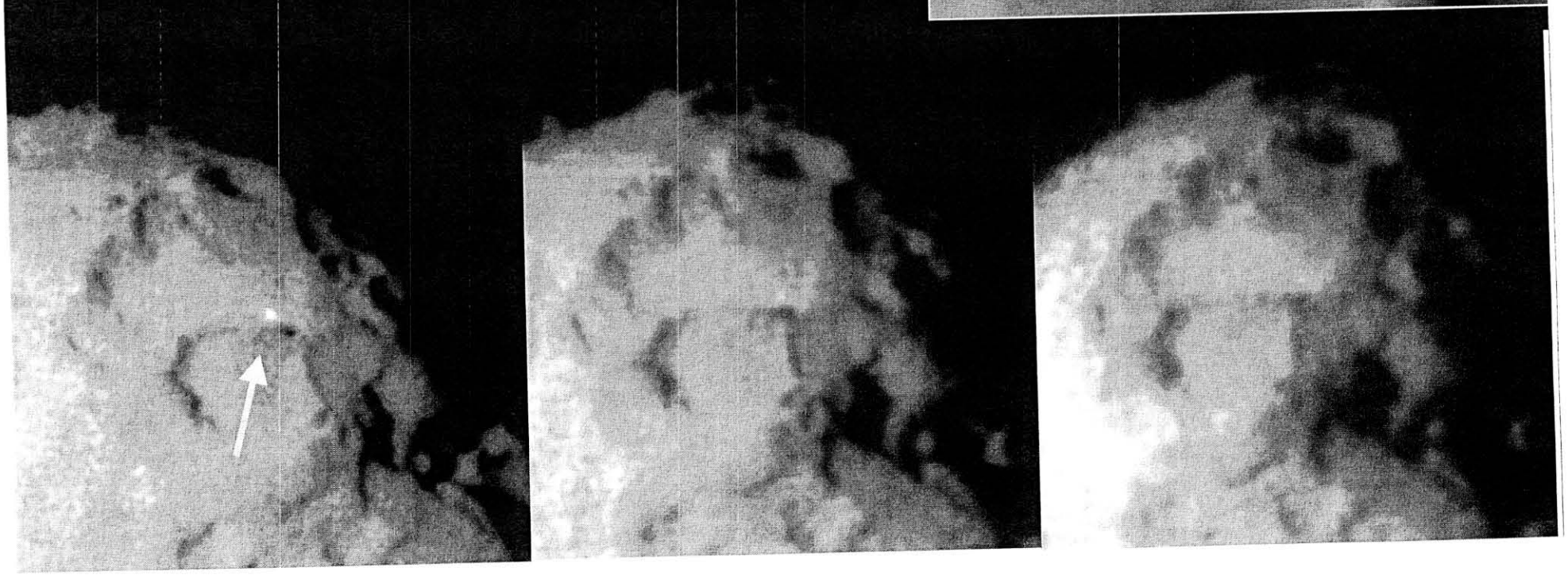
# White Spot

## A dust jet above the surface?




3 views from different angles



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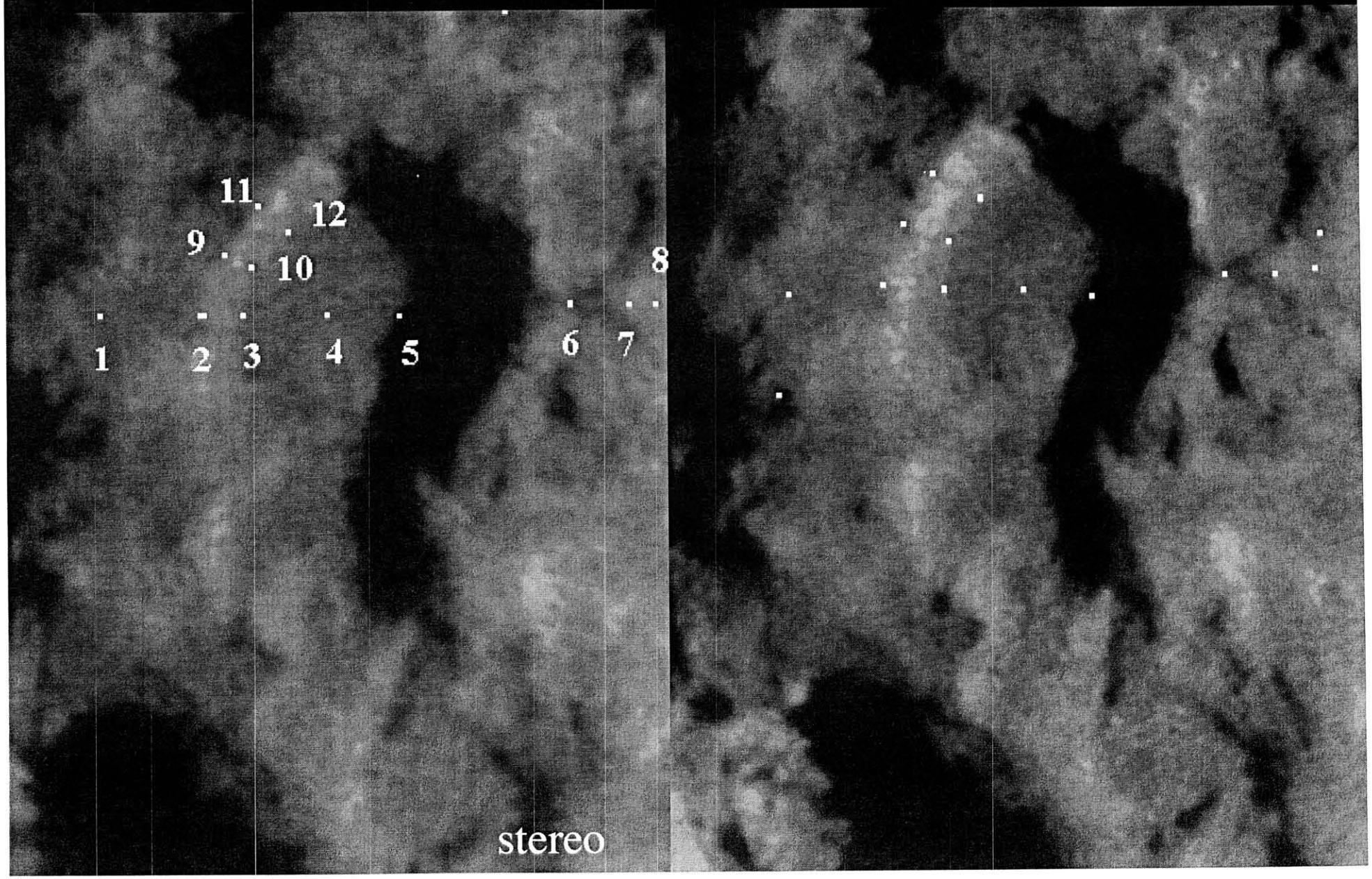
# >100m high cliff - very flat floor



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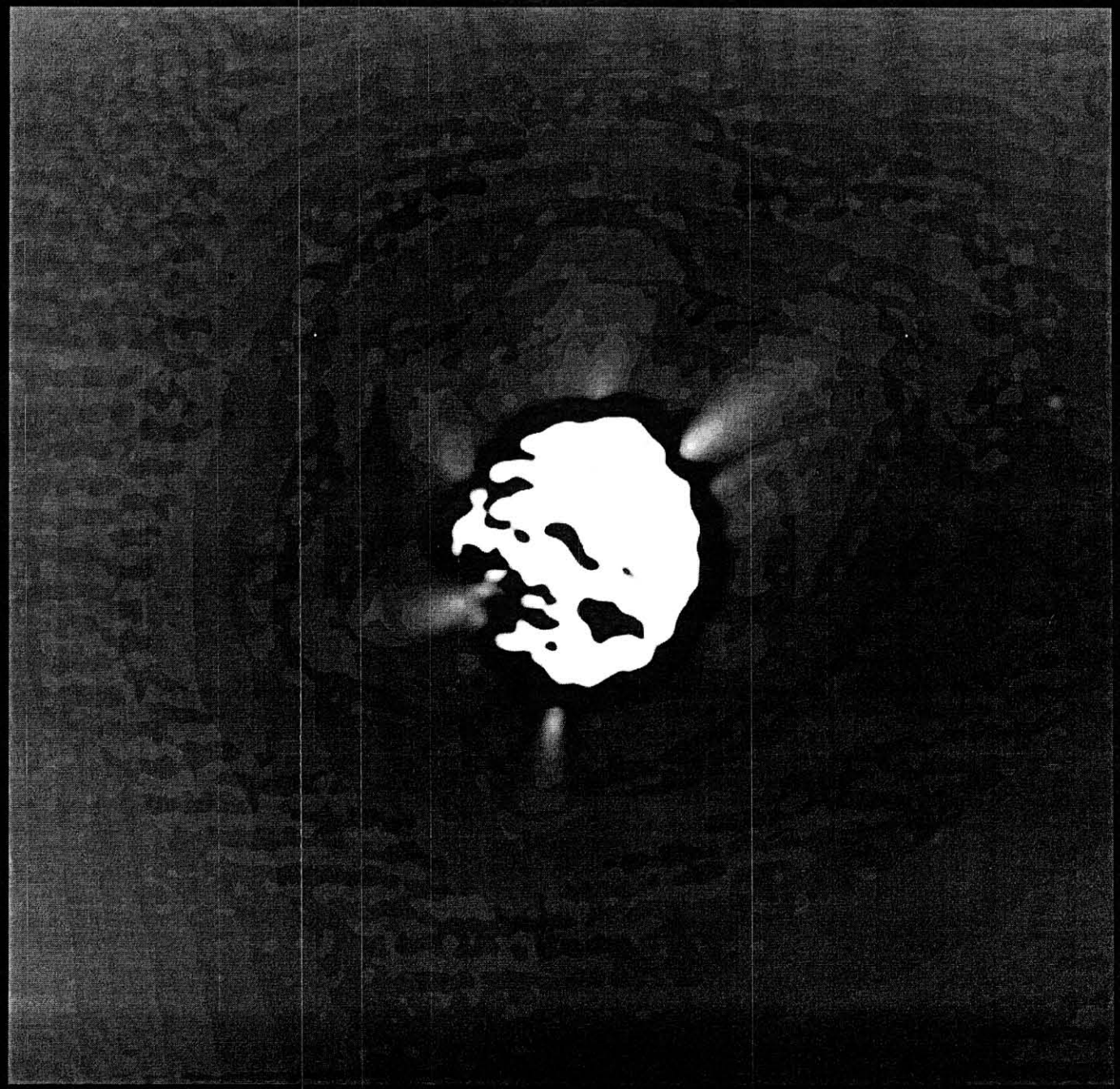

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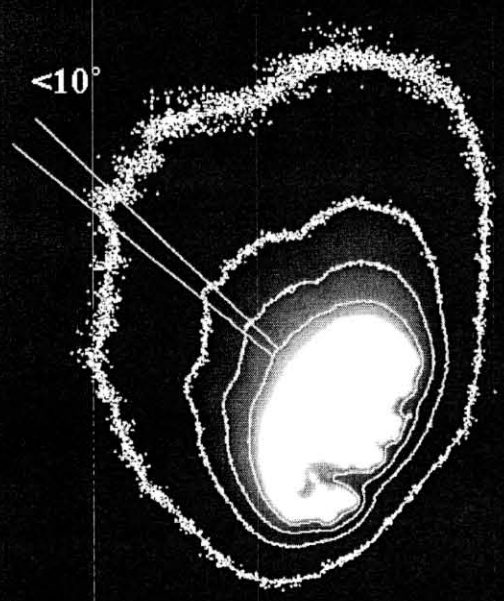

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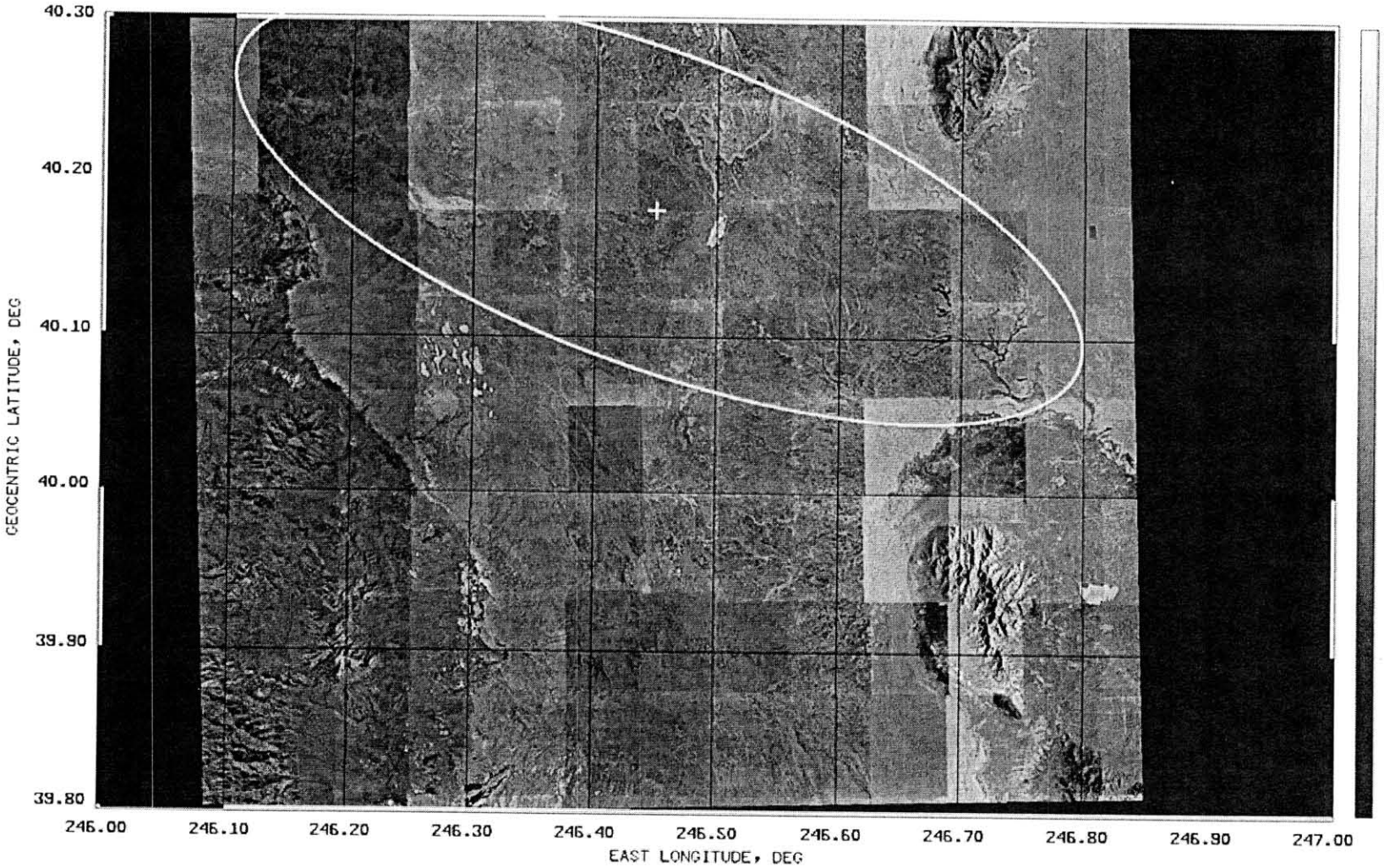
# STARDUST

AEROGEL
CAPTURE
233 PARTICLES
COUNTDOWN -14 s 311 km

THE UTTR LANDING SITE