The Phoenix Mars Mission

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And the Phoenix Science Team

Polar Gateways Conference
January 29, 2008
Odyssey Gamma Ray Subsystem sees ice within the top meter of the surface (July 2002)

Models predict ice;
Dark blue signal shows high H content

Goal #1: Study the history of and current state of water
  • Was there past standing water?
  • Does unfrozen water exist?
  • What processes shape the surface?
  • What is the amount and state of water in the atmosphere?
  • How much water is in the surface vs. the atmosphere?

Goal #2: Search for habitable zones (not life detection)
  • Are there organics in the soil and do they vary with depth?
  • Are there other biogenic elements?
  • Can unfrozen water layers exist?
  • Is the soil acidic or basic?
Phoenix: Reborn from 2 previous spacecraft

1998 Mars Polar Lander

2001 Mars Lander Spacecraft
MECA: wet chemistry

TEGA
MECA Wet Chemistry and the Thermal and Evolved-gas Analyzer (TEGA)
Phoenix

Robotic Arm:
- ice tool
- scraper blades
- scoop

Thermal and electrical conductivity probe

Yao Ming (7'6'')

2.35m (7'7'')
Ice acquisition tools
Surface Stereo Imager

Robotic Arm camera

Optical and Atomic-force Microscopy
Imaging at multiple scales

• Robotic arm camera can see scoop particles as small as 0.5 mm
• Panoramic color/stereo imager can see trench layers or particles as small as 2 mm
Microscopy station (0.1-2000 μm resolution)

Microscopes and sample wheel

AFM on sand exposed to aeolian and aqueous erosion

AFM on ice crystal on mica

This optical microscope image particles is a composite of 3 pictures taken under red, green, and blue illumination.
Where is the best place to land?

- **Science**
  - Access to ice
  - Evidence for ice processes
  - Latitude: 65° - 72° N

- **Safety**
  - Elevation: < -3500 m
  - Slopes: < 16°
  - Small amount of large rocks
    - 35 cm high rock is damaging
  - No large hazards (craters)
  - Ellipse ~150x30 km (100x20 mi)
To: Peter and the Phoenix Team

Happy Halloween!!

From Alfred and the HiRISE Team
To Peter and the Phoenix Team:

Happy New Year 2007!

From Alfred and the HiRISE Team
The Valley of Safety

[Map image showing 250 m relief and 25 km scale]
What might the surface look like? 
The Antarctic Dry Valleys?

M. Mellon
Phoenix will make significant steps forward in our understanding of the history of water and the habitability potential of the north polar region of Mars.

http://phoenix.lpl.arizona.edu