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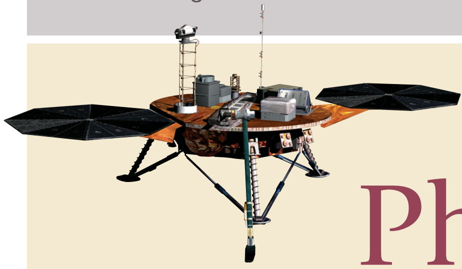


Phoenix Mars Mission

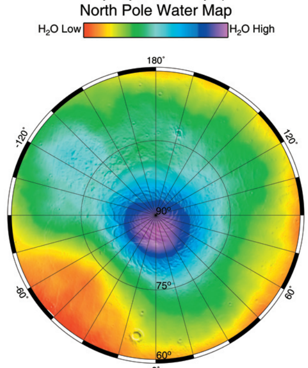
Uncovering the Mysteries of the Martian Arctic

The ***Phoenix Mars Mission***, scheduled for launch in August 2007, is the first in NASA's "Scout Program." ***Phoenix*** is designed to study the history of water and search for complex organic molecules in the ice-rich soil of the martian arctic. ***Phoenix*** inherits a highly capable spacecraft built for the Mars Surveyor Program 2001 (MSP '01) lander, as well as scientific instruments from the Mars Polar Lander (MPL). Using the lessons learned from the MPL and MSP '01 experiences, the mission engineering team is working on developing enhanced spacecraft reliability through extensive testing, (i.e. beyond normal integration and environment testing that occurs for all missions).

What will Phoenix find in Mars' Northern Plains?

Mars is a cold desert planet with no liquid water on its surface. However, discoveries made by the Mars Odyssey Orbiter in 2002 show large amounts of subsurface water-ice in the northern arctic plains. The ***Phoenix*** lander targets this region; a robotic arm digs through the protective top soil layer to the water-ice below; and ultimately, brings both soil and water-ice to the lander platform for scientific analysis.

2001 Mars Odyssey Gamma Ray Spectrometer
North Pole Water Map



Continuing Mars Exploration

Phoenix is designed to be an innovative, low-cost part of the NASA's Mars Exploration Program and will be instrumental in achieving this program's long-term goals: (1) Determine whether Life ever Arose on Mars, (2) Characterize the Climate of Mars, (3) Characterize the Geology of Mars, and (4) Prepare for Human Exploration.

The Phoenix Team

The ***Phoenix Mars Lander Mission*** is operated for NASA by the Lunar and Planetary Laboratory at the University of Arizona in partnership with the Jet Propulsion Laboratory, Lockheed Martin, and the Canadian Space Agency. In addition to these major partners, scientists from academic institutions and laboratories around the world will participate in the mission. Peter Smith of the University of Arizona's Lunar and Planetary Laboratory heads the ***Phoenix Mission***, the first mission to Mars led by an academic institution.

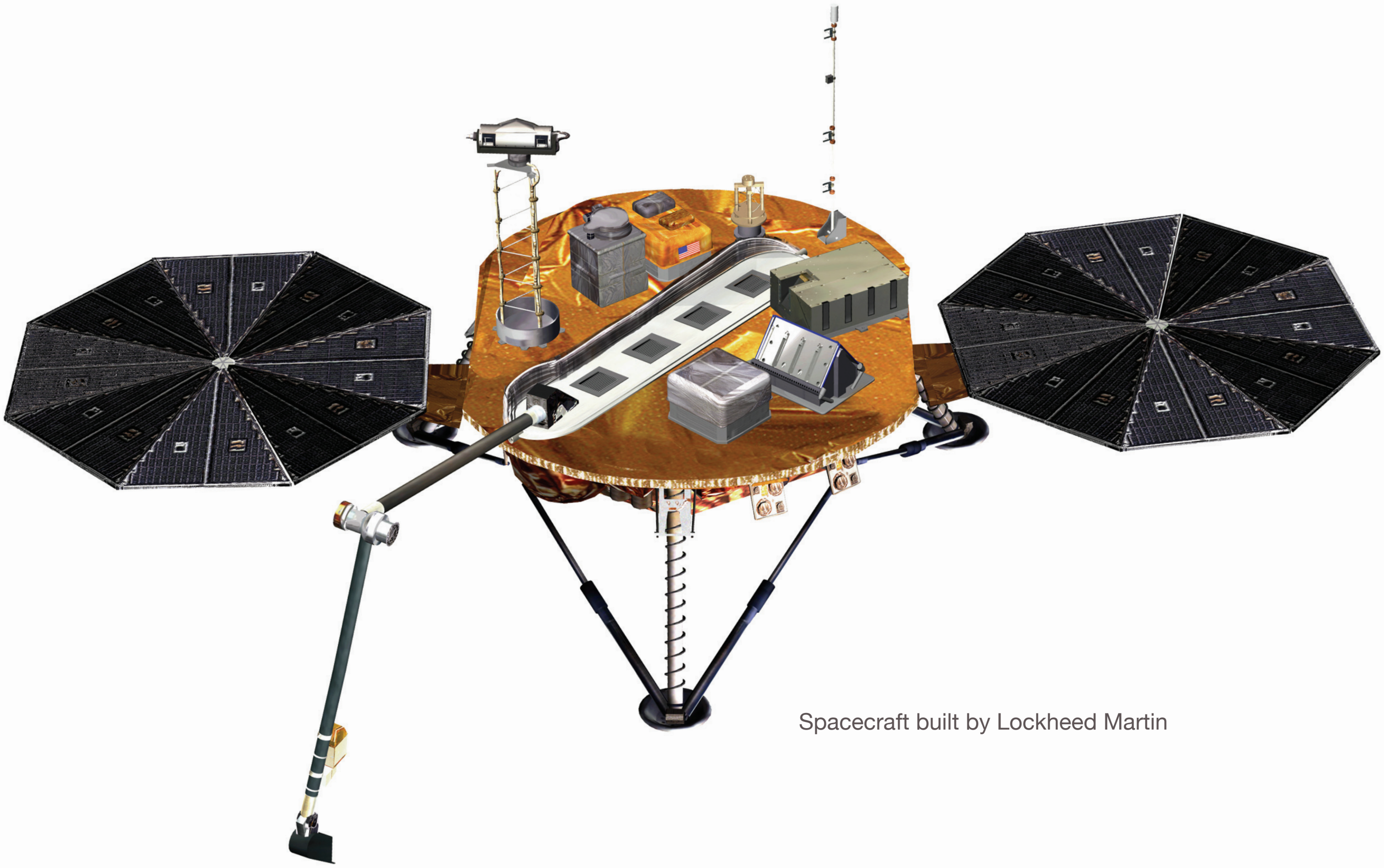
Rising from the Ashes

Like the Phoenix bird of ancient mythology, the ***Phoenix Mars Mission*** is reborn out of fire; this new mission was created from the embers of previous Mars endeavors. ***Phoenix*** will use many components of two unsuccessful Mars missions, MPL and MSP '01. Using lessons learned and an extensive testing program, scientists and engineers are confident that ***Phoenix*** will rise from the ashes revealing clues in the martian arctic soils about the history of water and potential for biology.

The Phoenix Mars Lander seeks to verify the presence of water and habitable conditions in the martian arctic.

1) Study the history of water by examining water-ice below the martian surface.

Liquid water does not currently exist on the surface of Mars, but evidence from Mars Global Surveyor, Odyssey, and Exploration Rover missions suggest that water once flowed in canyons and persisted in shallow lakes billions of years ago. However, ***Phoenix*** will probe the history of liquid water that may have existed in the arctic as recently as 100,000 years ago. By digging into the soil and water-ice just below the surface and analyzing the chemistry of the soil and ice with robust instruments, scientists will better understand the history of the martian arctic.



Spacecraft built by Lockheed Martin

2) Determine if the martian arctic soil could support life.

Recent discoveries show that life can exist in the most extreme conditions. Certain bacterial spores lie dormant in bitterly cold, dry, and airless conditions for millions of years and become activated once conditions become favorable. Such dormant microbial colonies may exist in the martian arctic, where during brief periods about every 100,000 years the soil environment is believed to be favorable for life. ***Phoenix*** will explore the habitability of the martian environment by using sophisticated chemical experiments to assess the soil's composition of life-giving elements such as carbon, nitrogen, phosphorus, and hydrogen. ***Phoenix*** will also dig into the soil protected from harmful solar radiation, looking for organic life signatures.

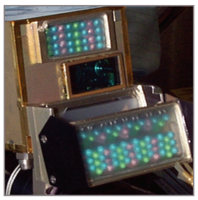
The Phoenix Mars Lander is being designed, built and operated for NASA by the Lunar and Planetary Laboratory at the University of Arizona in partnership with the Jet Propulsion Laboratory, Lockheed Martin and the Canadian Space Agency.

The science instruments aboard Phoenix represent some of the most sophisticated and advanced technology ever sent to Mars.

Robotic Arm (RA)

Built by the Jet Propulsion Laboratory

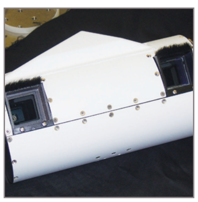
The RA is critical to the operations of the Phoenix lander and is designed to dig trenches, scoop up soil and water-ice samples, and deliver these samples to the TEGA and MECA instruments for detailed chemical and geological analysis.



Robotic Arm Camera (RAC)

Built by the University of Arizona and Max Planck Institute

The RAC is attached to the Robotic Arm (RA) just above the scoop. The instrument provides close-up, full-color images of (1) the martian surface, (2) prospective soil and water-ice samples, (3) collected samples in the RA scoop, and (4) the floor and side-walls of the trench to examine fine-scale texturing and layering.



Surface Stereoscopic Imager (SSI)

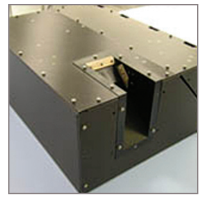
Built by the University of Arizona

SSI will serve as Phoenix's "eyes" for the mission, providing high-resolution, stereoscopic, panoramic images of the martian arctic. Using an advanced optical system, SSI will survey the arctic landing site for geological context, provide range maps in support of digging operations, and make atmospheric dust and cloud measurements.

Thermal and Evolved Gas Analyzer (TEGA)

Built by the University of Arizona and the University of Texas, Dallas

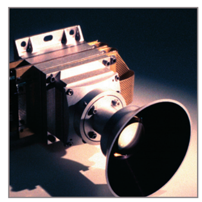
TEGA is a combination high-temperature oven and mass spectrometer instrument that scientists will use to analyze martian ice and soil samples. Small amounts of soil and ice will be delivered into eight tiny ovens. The oven temperature will increase and the power will be monitored. The gases that are boiled out of the sample will be piped to a mass spectrometer for chemical analysis. This process will give important information about the chemical character of the soil and ice.



Microscopy, Electrochemistry, and Conductivity Analyzer (MECA)

Built by the Jet Propulsion Laboratory, the University of Arizona, and the University of Neuchatel

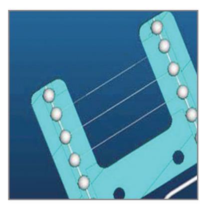
MECA is a combination of several scientific instruments including a wet chemistry laboratory, optical and atomic force microscopes, and a thermal and electrical conductivity probe. By mixing small amounts of soil in water, MECA determines important chemical properties like acidity, saltiness, and composition. Looking through a microscope, MECA examines the soil grains to help determine their origin and mineralogy. Needles stuck into the soil determine the water and ice content.



Mars Descent Imager (MARDI)

Built by Malin Space Science Systems

MARDI plays a key science role during Phoenix's descent to the martian arctic. Beginning just after the aeroshell is jettisoned at an altitude of about 5 miles, MARDI will acquire a series of wide-angle, color images of the landing site all the way down to the surface.



Meteorological Station (MET)

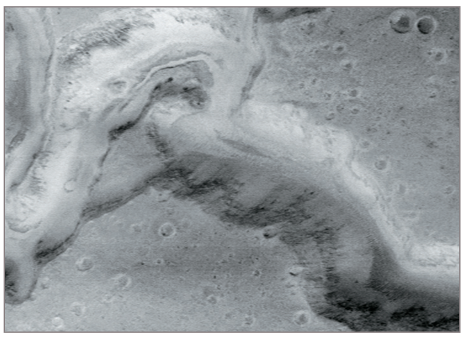
Built by the Canadian Space Agency

Throughout the course of Phoenix surface operations, MET will record the daily weather of the martian northern plains using temperature and pressure sensors, as well as a light detection and ranging (LIDAR) instrument. With these instruments, MET will play an important role by providing information on the current state of the polar atmosphere and how water is cycled between the solid and gas phases in the martian arctic.

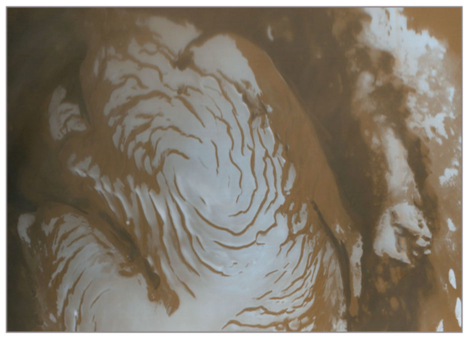
Phoenix Mars Mission: Water on Mars

Today, Mars is a cold, dry world with a thin, carbon-dioxide atmosphere. Mars' surface has no liquid water – no rivers, lakes, or oceans. However, evidence exists suggesting Mars was very different in the past. How do we know? What is the evidence? Extensive spacecraft exploration of Mars has revealed geologic features that lead us to believe liquid water once flowed on Mars. Channels connect high and low areas convincing most scientists that water eroded these channels long ago. Gullies are another geologic feature providing evidence of past liquid water on Mars, and scientists are actively debating the formation of these gullies. One idea suggests that liquid water, flowing underneath a protective layer of snow, may form martian gullies similar to those on Earth. No evidence exists of liquid water currently flowing on the surface, but evidence of past liquid water on the surface continues to build. Liquid water is important because all known life forms require it to survive. The exploration and discovery continues with scientists on Earth, robots like ***Phoenix,*** and maybe someday, humans on Mars.

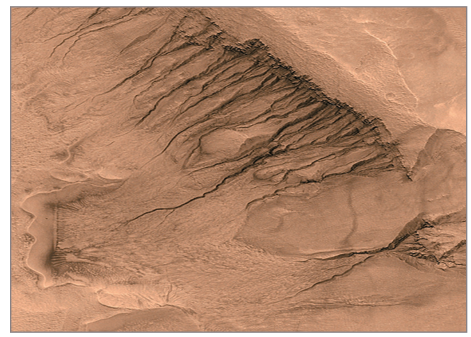
Although scientists do not believe liquid water currently exists on the martian surface, they know water exists in the form of ice. Both the north and south polar caps are made of frozen water.



Channels, Nanedi Vallis, Mars



Water-Ice, North Polar Cap, Mars



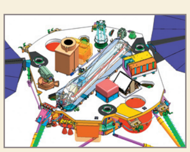
Gullies, Terra Sirenum, Mars

Images: NASA/JPL/Malin Space Science Systems

The Phoenix Mission Timeline

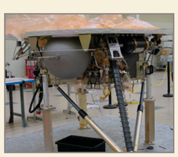
Aug. '03 – Design

The ***Phoenix Mars Lander*** is selected as the first NASA Scout Mission.



June '05 – Build and Test

NASA confirms the ***Phoenix Mars Mission*** and gives the green light to move forward.

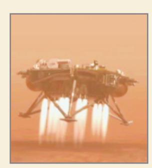


April '07 – Launch Prep

Phoenix is delivered to the Kennedy Space Center in Cape Canaveral, Florida.

Aug. '07 – Cruise

Phoenix launches on a Boeing Delta II rocket.



May '08 – Science Ops – Sept. '08

Phoenix arrives in the martian north polar region and begins primary operations.