Current Status of Mars Scouts

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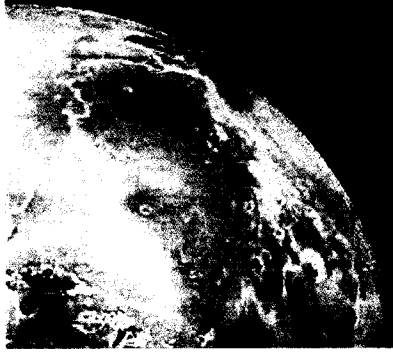
NASA

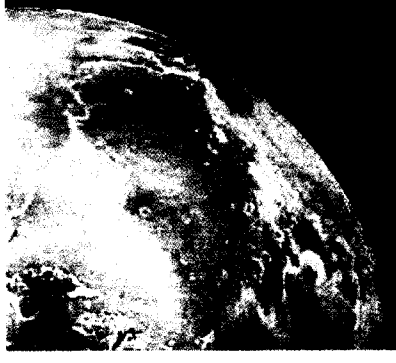
Outline

- Why Mars Scouts?
- What are Mars Scouts?
- When is a Scout likely to launch?
- Summary of Concepts to Date
- Concepts Currently Studied
- Mars Infrastructure and Scouts
- Scout Technologies
- Future Work



Why Mars Scouts?

- Achieve program science goals not otherwise covered in the baseline plan.
- Optimize the use of limited resources to accomplish the best science
- Provide the flexibility to quickly respond to discoveries at Mars.



Mars Mission Timeline

2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014

Orbiters (on-orbit)

MGS Relay

2001 Odyssey Telecom Relay

Mars Express Telecom Relay

Nozomi

MRO Telecom Relay

ASI/NASA Telesat

CNES Orb

ESA/NASA Science Orbiter

Landers (surface operations)

Beagle 2

MER Twins Netlanders

MSL

MSR?

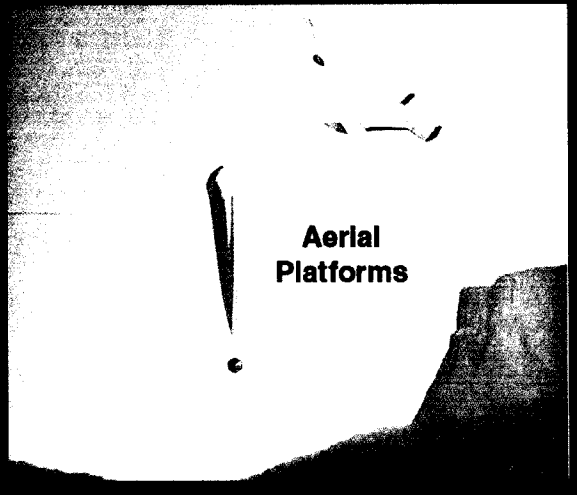
Competed Scout Mission

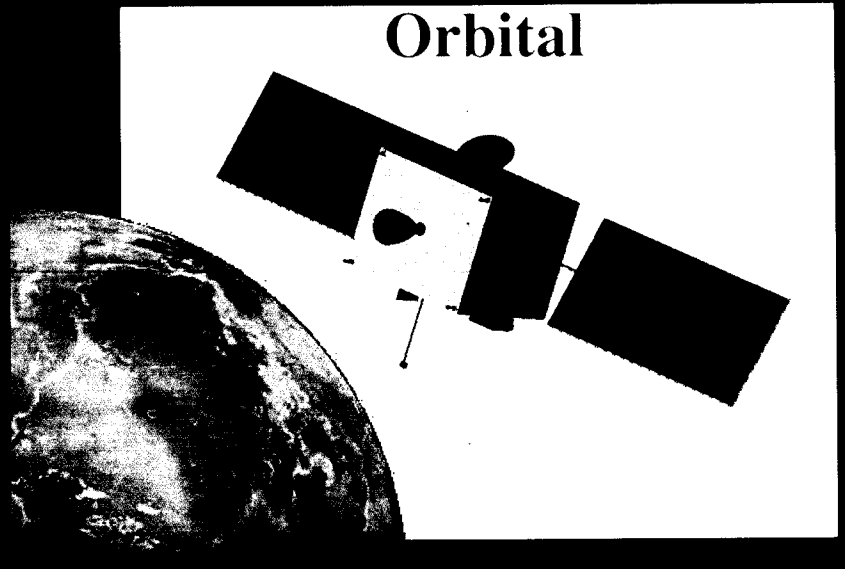
Tech

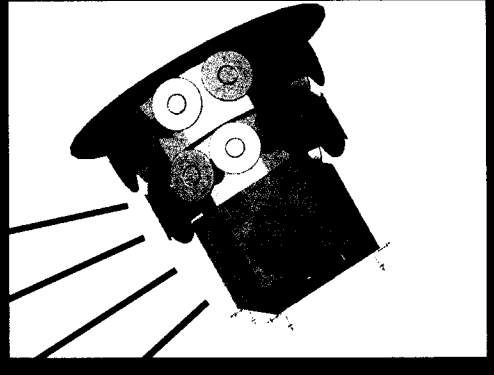
Smart Lander, MSR and Other Technologies

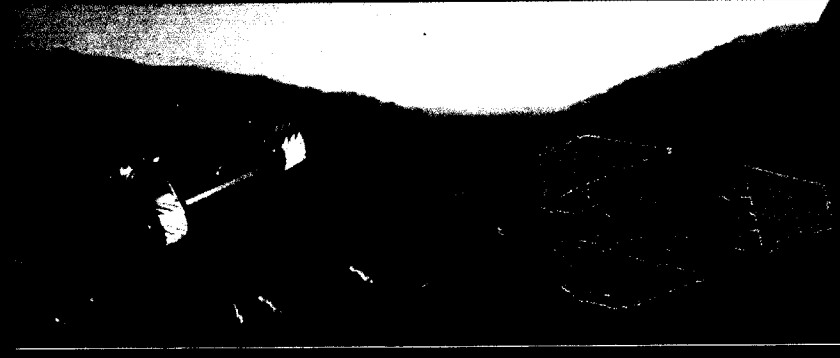
What are Mars Scouts?

PI-led missions:

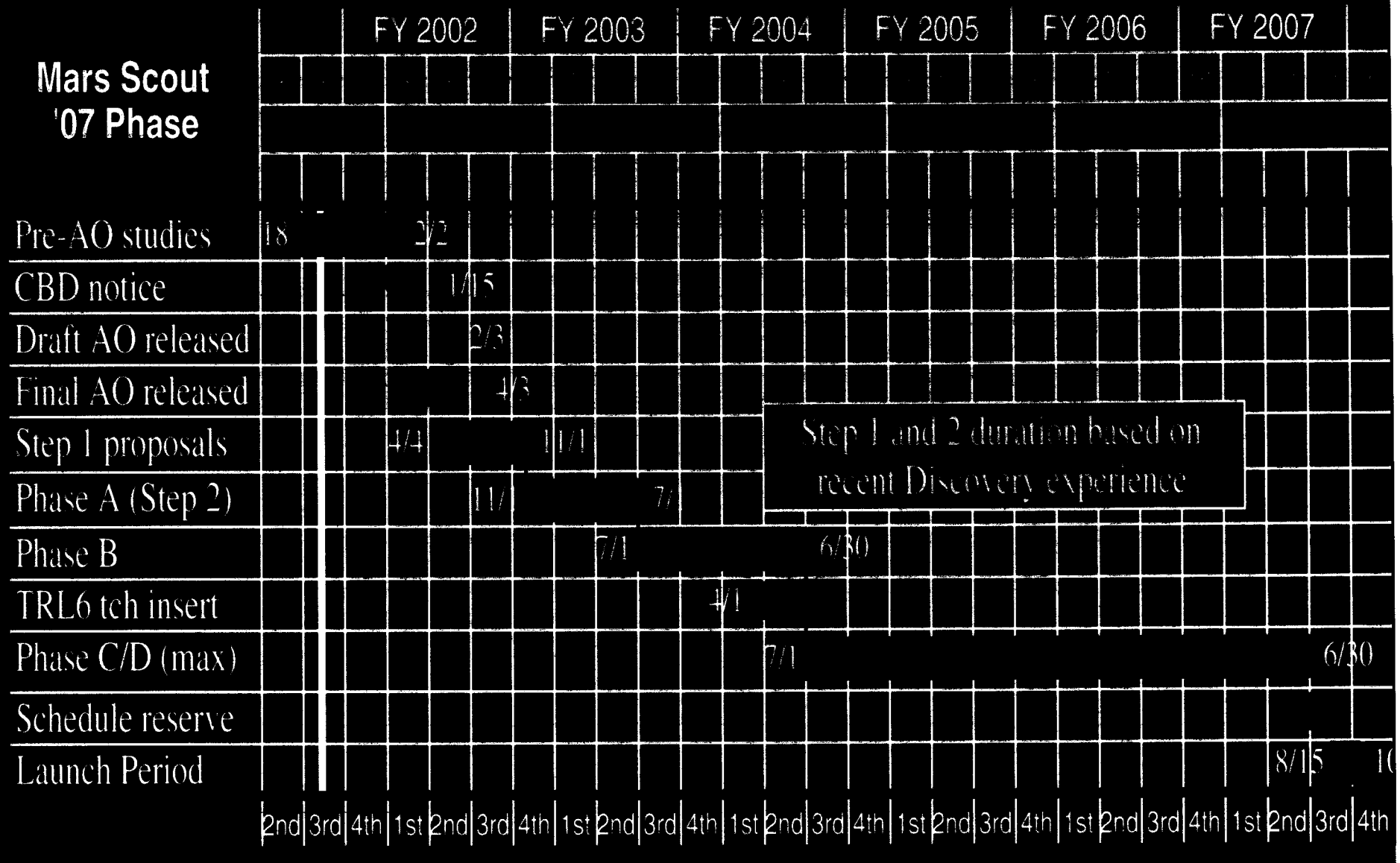








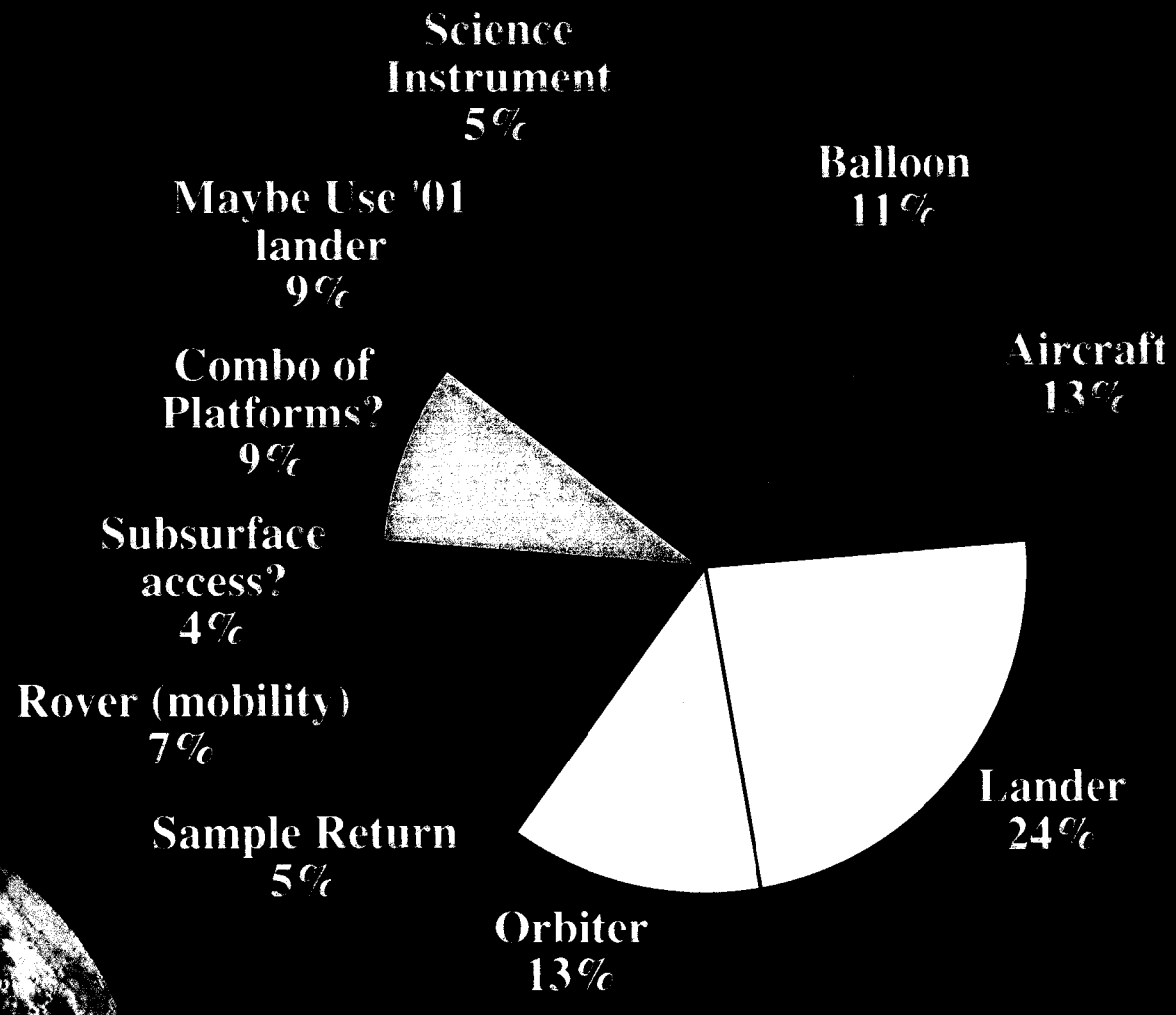
When is a Scout Going to Launch?



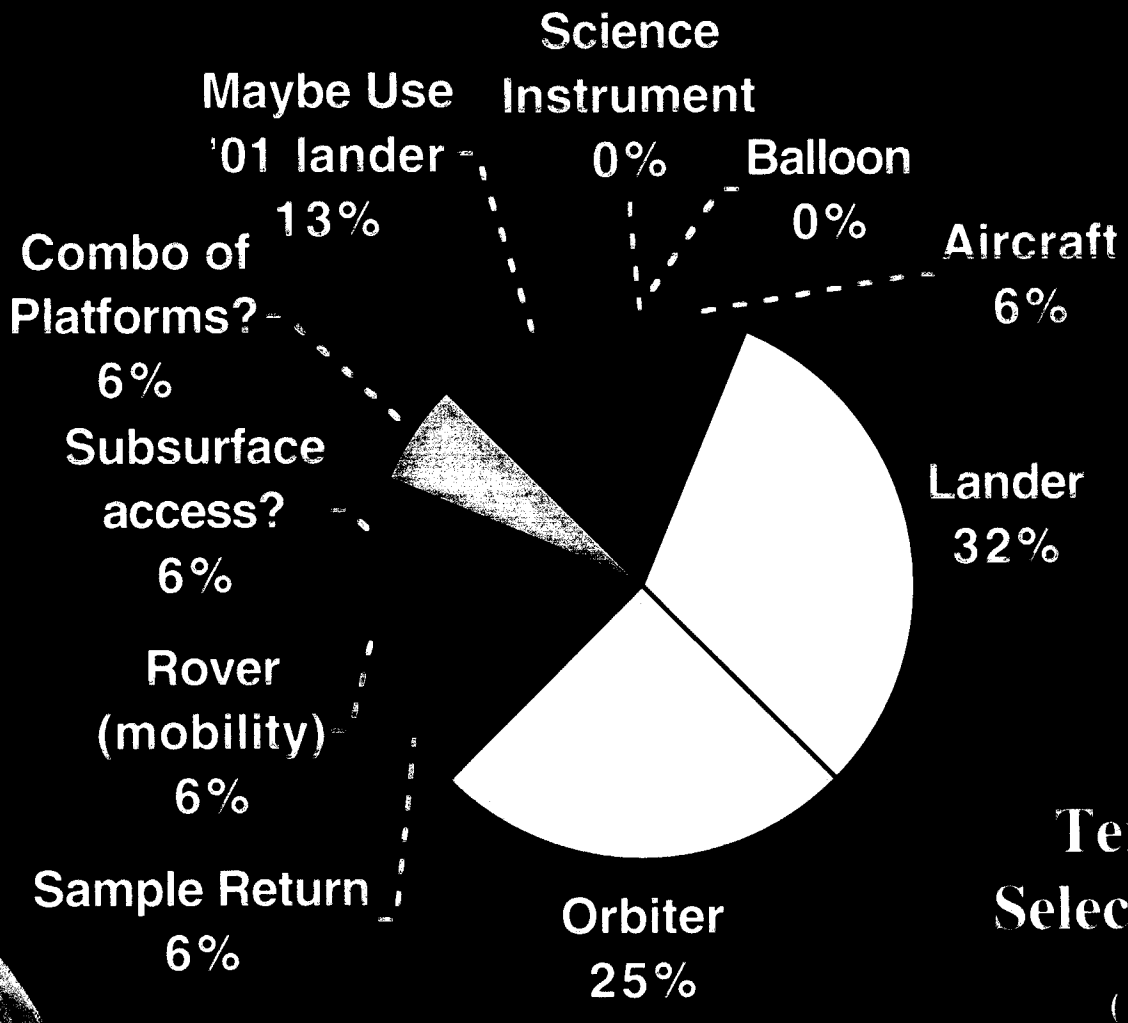
May '01 Scout Workshop

- Encourage Community Cross-Fertilization
- Select 6-10 Concepts for Further Study
- Selected Concepts Help Scope '02 AO
  - ✓Possible Science
  - ✓Needed Technology
  - ✓Cost/Schedule/Risk
- 43 Concepts Submitted, 10 Selected
- Selected Concepts DO NOT Prejudice AO

Summary of Submitted Concepts



Concepts Currently Studied



Ten Concepts Selected for Study

(~150K each)

Ten Selected Scout Studies

Area	Study Title	PI (institution)	Short Description
Landers/Rovers	The Urey Mission	Plescia (USGS)	Lander/Rover for age dating.
	The NAIADES	Grimm (Blackhawk Geoservices)	Low frequency electromagnetic sounding for groundwater.
	Artemis	Paige (UCLA)	Multiple polar small landers to the north and south poles.
	Cryoscout	Carsey (JPL)	North Polar probe melts into ice.
	PASCAL	Haberle (ARC)	Global meteorology network.
Orbiters	Mars SAR	Campbell (Smithsonian)	Global imaging radar from orbit.
	Mars Atm Const Obs	Kursinski (UA)	Radio sounding of Mars atmosphere from multiple orbiters.
	Mars Env Obs	Janssen (JPL)	Orbital observation of Mars' atmosphere.
Aerial	KittyHawk	Calvin (UNR)	Multiple gliders observing Valles Marineris.
Sample Return	SampleCollection for Investigation of Mars	Leshin (ASU)	High altitude Martian dust collection and return to Earth via Mars atmospheric flyby.

General Scout Technologies

- Lightweight Propulsion Components
  - ✓ Tanks
  - ✓ Filters, Regulators, Valves
  - ✓ Thrusters (Low Min Impulse Bit [mN])
- Lightweight telecomm components
  - ✓ Antennas
  - ✓ Transmitters
  - ✓ Receivers
- Minimum mass structures
- Low mass, low power, small volume instruments

Scout Orbiter Technologies

- Minimum mass Electra
- High capacity, low mass, on-board storage (mass memory)
- Low mass Mars-Earth antennas (deployable?)
- High power, low mass Mars-Earth transmitter
- Cross-link (receive only?) capability

Driver for orbiters is always data to Earth capability!

Scout Near-Surface / Surface Technologies

- Small, robust Entry/Descent systems (delivered surface payload varies from 5 - 150 kg)
- Precise control of entry corridor (similar to MSL)
- Entry/Descent Critical Event Comm
- Accurate delivery to atm interface (opnav, adv radio nav techniques)
- Autonomy --> ability to carry out mission with minimal ground interaction as time is short for small missions

Near-Surface (airplane, balloon) Technologies

- Guidance and Navigation (small, lightweight, sun sensors, horizon sensors, terrain recognition)
- Extremely lightweight telecomm (total payload may be only a few kg per probe, including instruments)
  - ✓ Antennas
  - ✓ Transmitters/Receivers
- High efficiency, light weight solar cells
- Adv structures (thin materials for balloon, light weight airfoil shapes, deployment mechanisms)

Surface Technologies

- Low temperature, long life, low mass (low power?) power sources (solar, battery, RHU, RPS)
- Precision landing, hazard tolerance (hazard avoidance?) similar to MSL, but for very much smaller probes (5 - 150 kg payload)
- Mobility (meters to kilometers)
- Deployment mechanisms (during various phases of EDL and on surface)
- Low mass (~0.1 kg?), long-life (years), low power (mW - W) power systems enabling for network mission

Future Work

- Get AO out so schedule can proceed!!!
- Finish Analyzing Results of Studies
- Begin Preparation for Competed Scout Technologies for post-2007 Scouts
- Get 2007 Mission Selected for Flight

Mars Scouts are an Exciting Addition to the Mars Program!