



Mars Science Laboratory Mission Overview and AO/PIP Documentation

MSL AO Pre-Proposal Conference

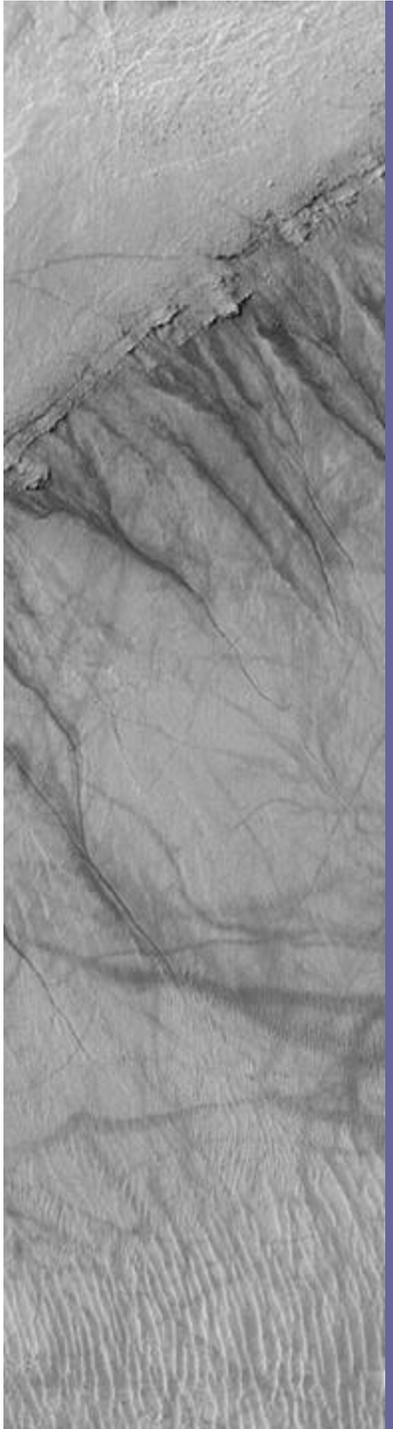
4 May 2004

Jeff Simmonds



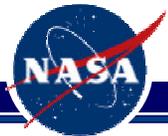
Discussion Topics

- Mission Overview and Project Status
- Available Documentation for Proposers
 - Website Organization and Contents
 - Where to find Key Documents and Information
- Notes on Proposal Content



Mars Science Laboratory
Pre-Proposal Conference

**Mission Overview and
Project Status**



MSL Mission Objectives

From the AO:

To explore and quantitatively assess a local region on the Mars surface as a potential habitat for life, past or present. This mission will use a variety of instruments carried on a rover platform that will operate under its own power and telemetry and is expected to remain active for one Mars year.

Using:

Groups of landed, *in situ* investigations:

- 1) **Analytical laboratory investigations** that provide and use instruments or instrument systems to analyze Martian atmosphere (gas) samples and/or regolith, rock, ice samples provided by the MSL Sample Acquisition, Processing, and Handling System;
- 2) **Remote sensing investigations** that provide and use instruments or suites of instruments to be mounted on the MSL Rover Mast;
- 3) **Contact instrument investigations** that provide and use instruments to be mounted on a robotic arm (or arms) to be provided by MSL; and
- 4) **Investigations** that provide and use individual instruments **mounted elsewhere on the MSL Rover** including a sensor to assess the radiation environment at the local Martian surface



Contributed Instruments/Investigations

Also: NASA has agreed to fly two Internationally Contributed Investigations on MSL

- a. An in situ analysis of the hydrogen content of the bulk surface (likely manifested as ice or OH bearing minerals) will be accomplished by an active neutron spectrometer provided to NASA through a cooperative agreement with the Russian Space Agency.
- b. An analysis of the landing site environment will be accomplished by a meteorology station measuring temperature, pressure, wind speed and direction, humidity, UV dose from 200 to 400nm, atmospheric dust, and local fluctuations in magnetic field provided to NASA through a cooperative agreement with the Spain's Ministry of Science and Technology.

Information Packages on these systems will be posted to the MSL Library as they become available.



MSL Project Status

- Project is in Phase A Formulation
 - Many details of design have yet to be established and/or finalized
 - Several areas are undergoing active trade studies
 - However, **Basic Payload Interfaces and Accommodations are baselined and described in AO/PIP**. Implementation details are being worked and specific accommodations will be tailored after the Science Investigations are selected
- **Proposals are to assume the baseline presented in the AO/PIP** and any subsequent system change decisions will be dealt with after selection.
- Project's Intent is to maintain the Payload Accommodations and Resources
 - Spacecraft and Mission parameters may be refined to meet constraints and generate margins, e.g.,
 - Size of Rover, details of Mobility system, etc.
 - Number of arms, Specifics of sample acquisition and delivery method
 - Latitude range, altitude, etc.



MSL Status

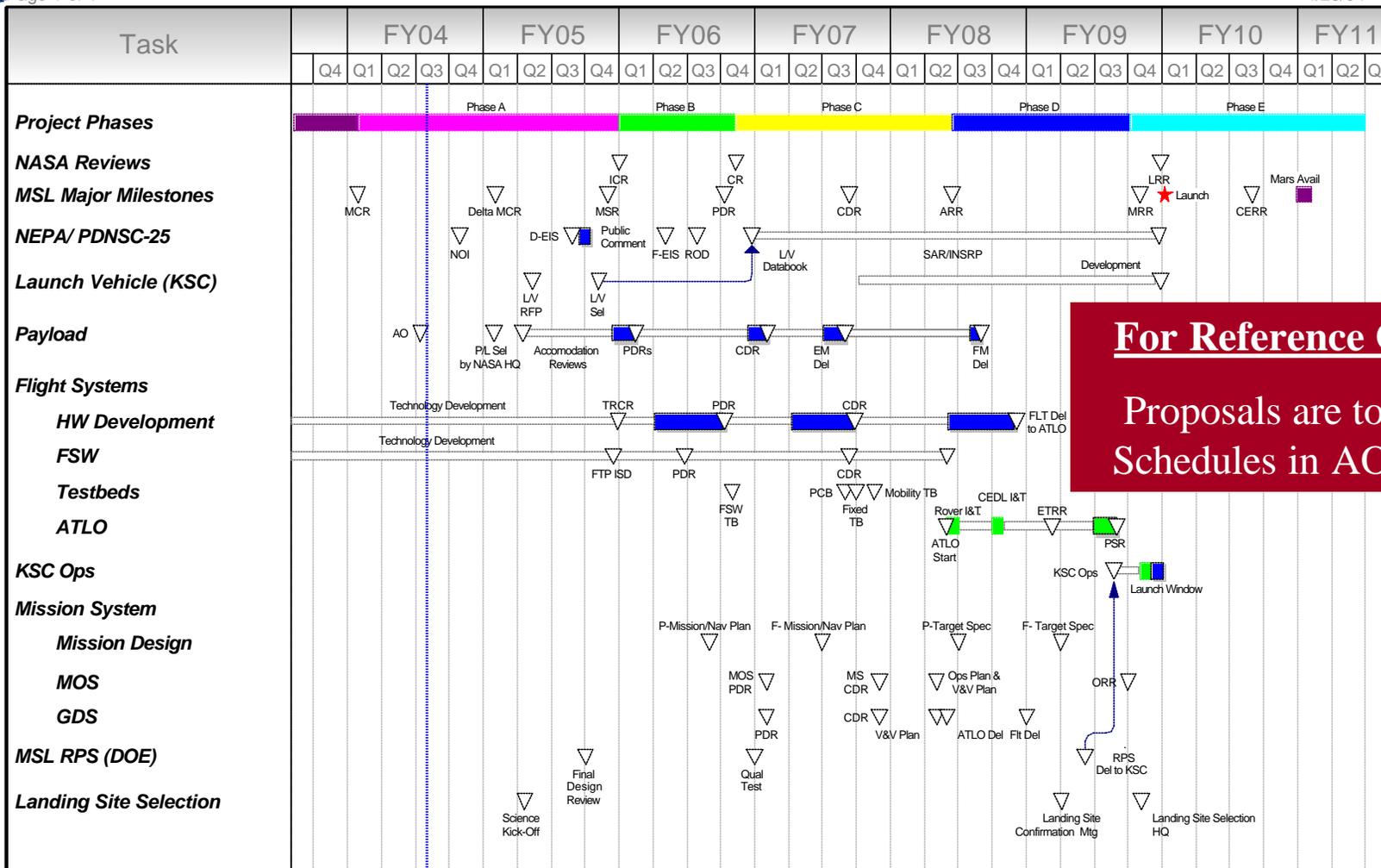
Top Level Schedule

Predecisional Draft

Mars Science Laboratory

Page 4 of 4

4/23/04



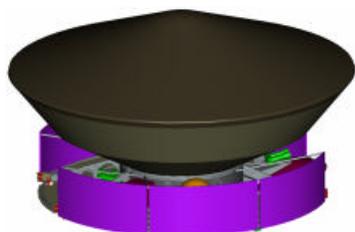
For Reference Only
 Proposals are to use
 Schedules in AO/PIP



PRE-DECISIONAL DRAFT: For Planning and Discussion Purposes Only



Mission Architecture



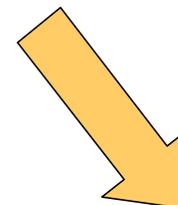
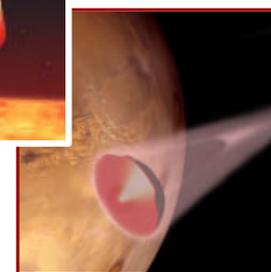
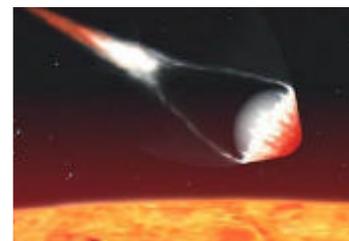
CRUISE/APPROACH

- 10-12 month flight time



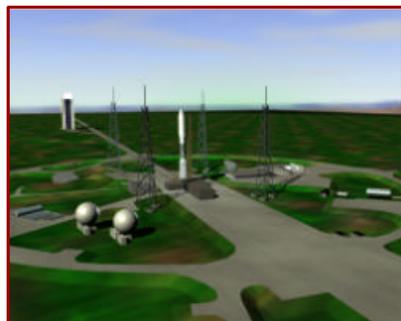
ENTRY/DESCENT/LANDING

- Direct Entry
- Comm provided by UHF link to MTO and other orbiters



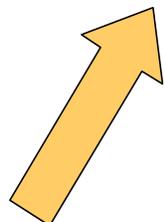
SURFACE MISSION

- Large rover
- One Mars year prime mission
- 2 to 4 km mobility
- Approx 100+ kg payload of instruments and support
- Radioisotope Power Source assumed, pending final design



LAUNCH

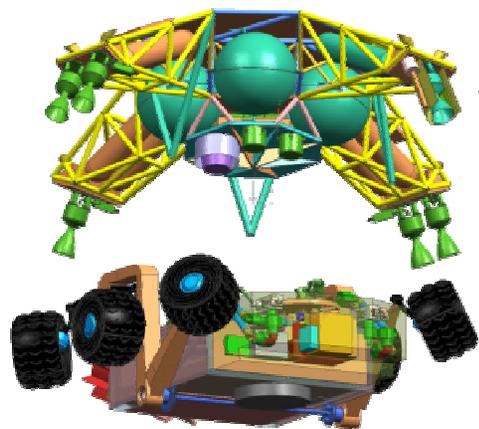
- ~Oct. 2009
- Delta IV/ATLAS V w/5-m fairing





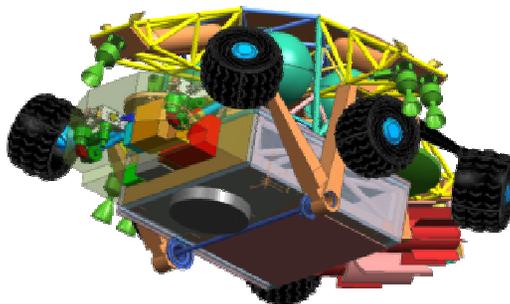
Major Assemblies

Descent Stage



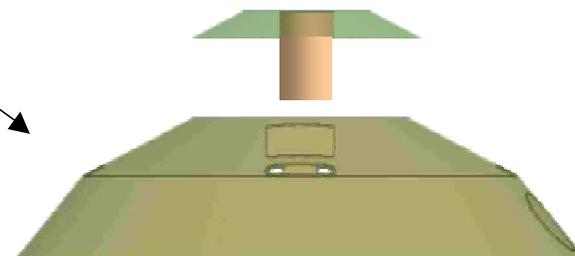
Rover

Descent System

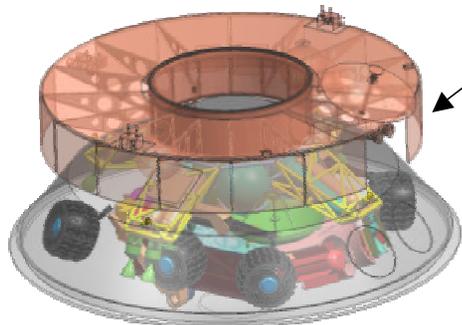
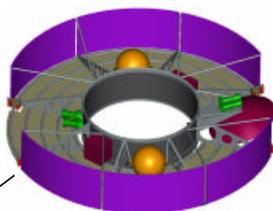


Major Spacecraft Assemblies

Descent System with Backshell

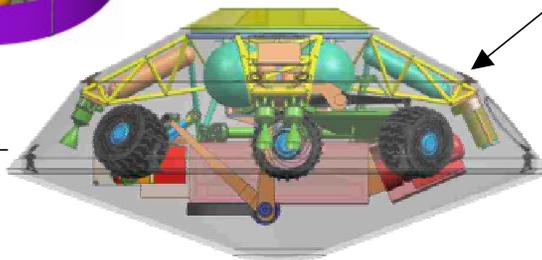


Cruise Stage



Launch & Cruise System

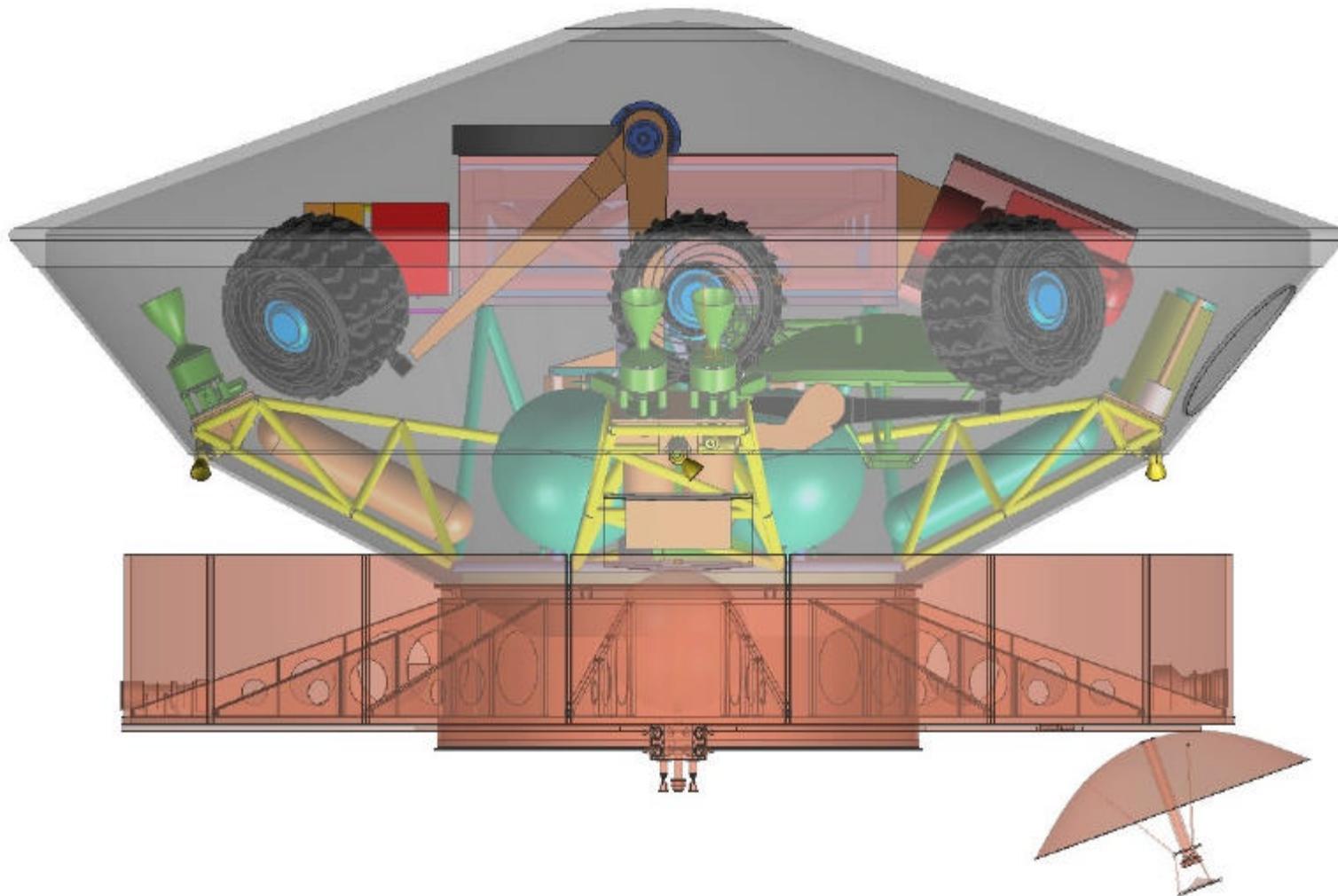
Entry System





Launch/Cruise Configuration

Mars Science Laboratory

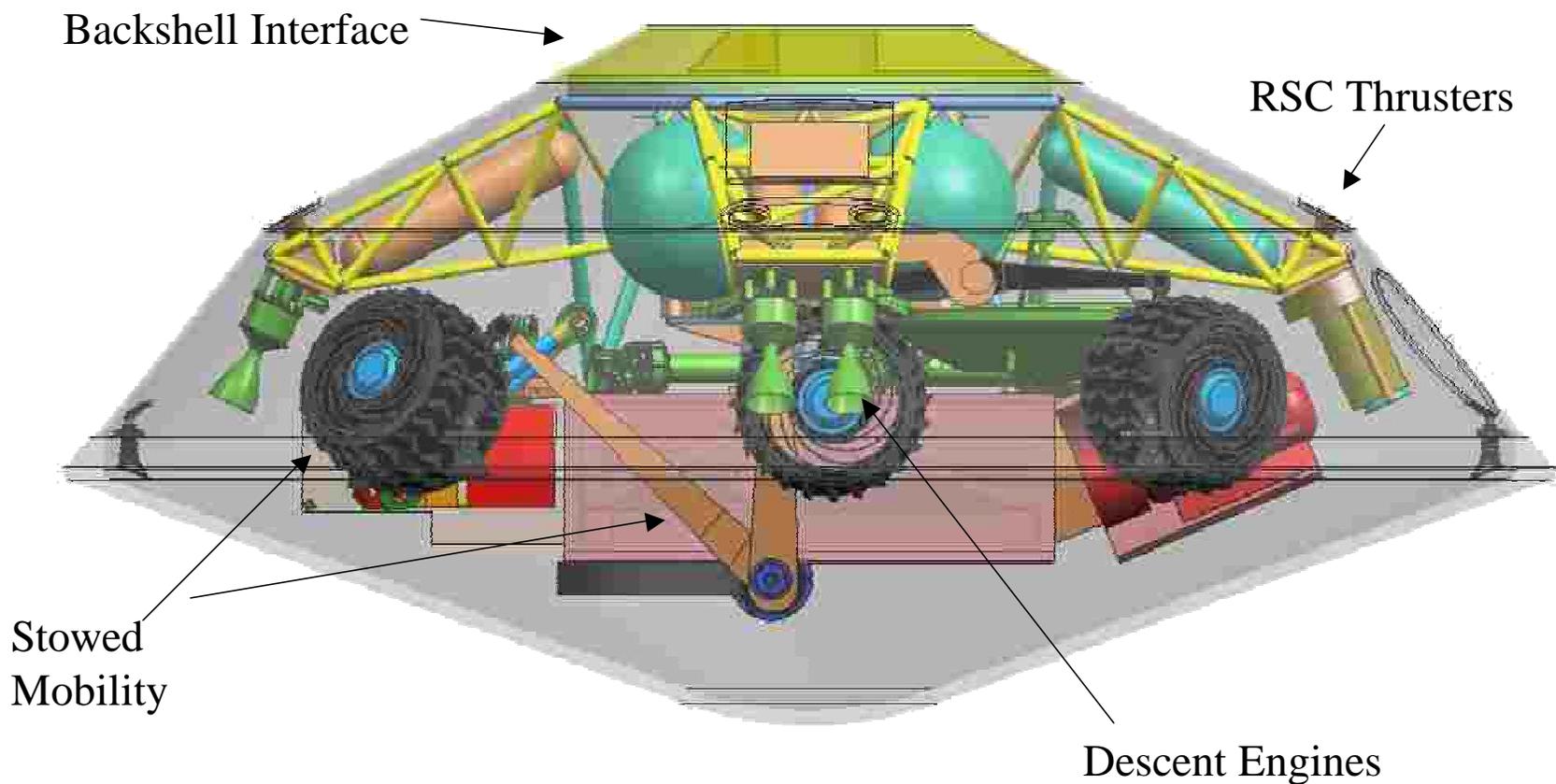


PRE-DECISIONAL DRAFT: For Planning and Discussion Purposes Only

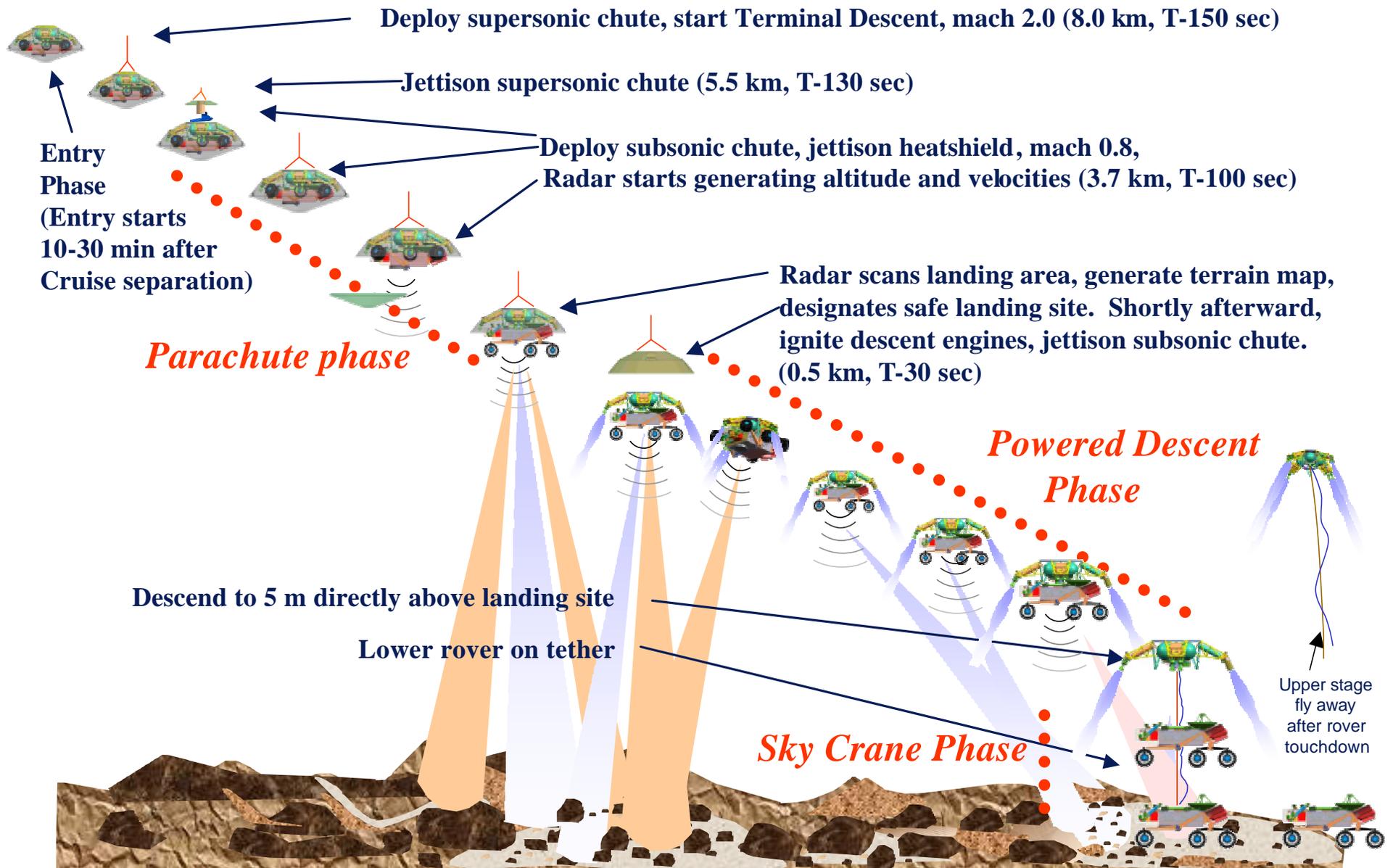


Entry Configuration (SkyCrane)

Mars Science Laboratory

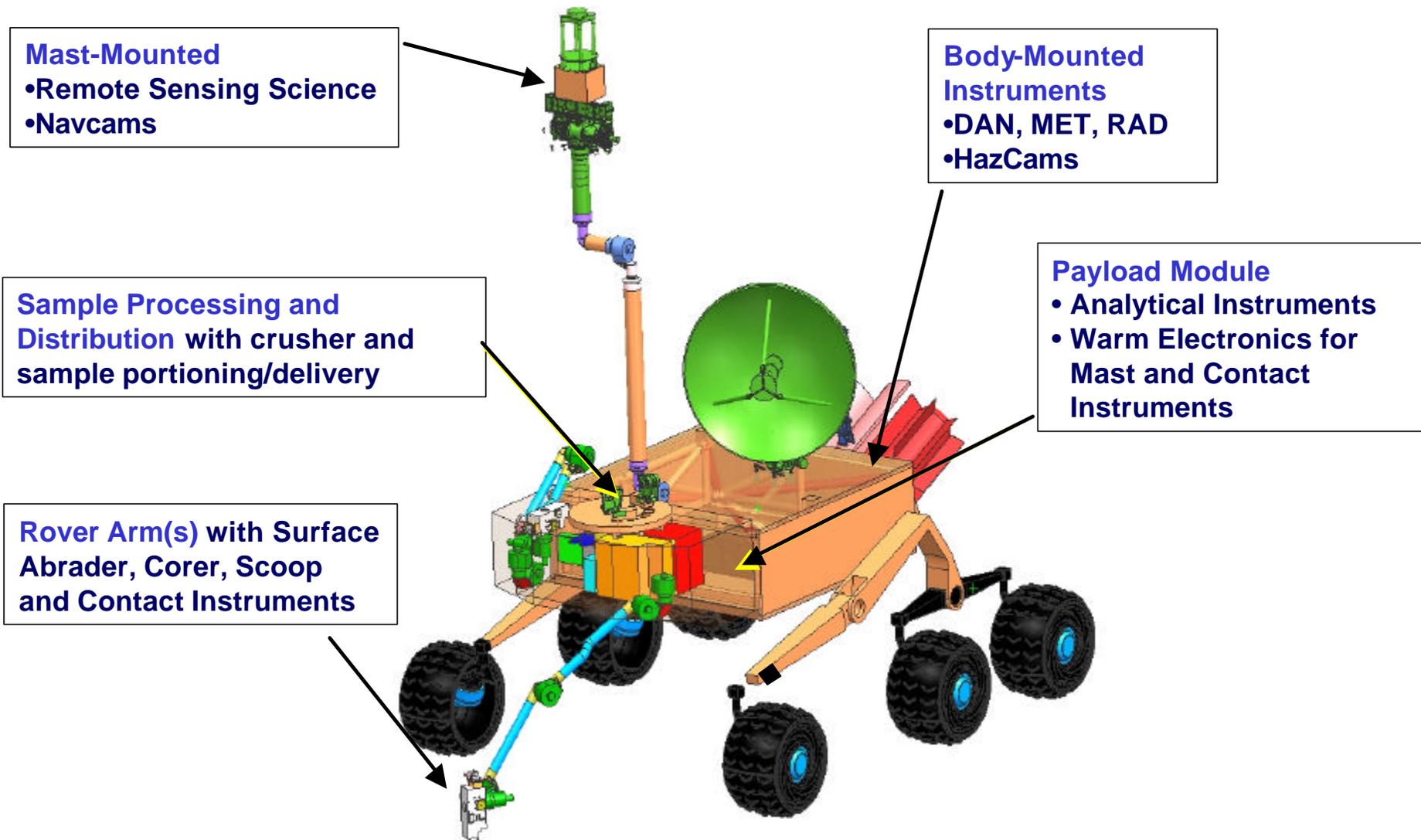


MSL Entry, Descent, and Landing Timeline

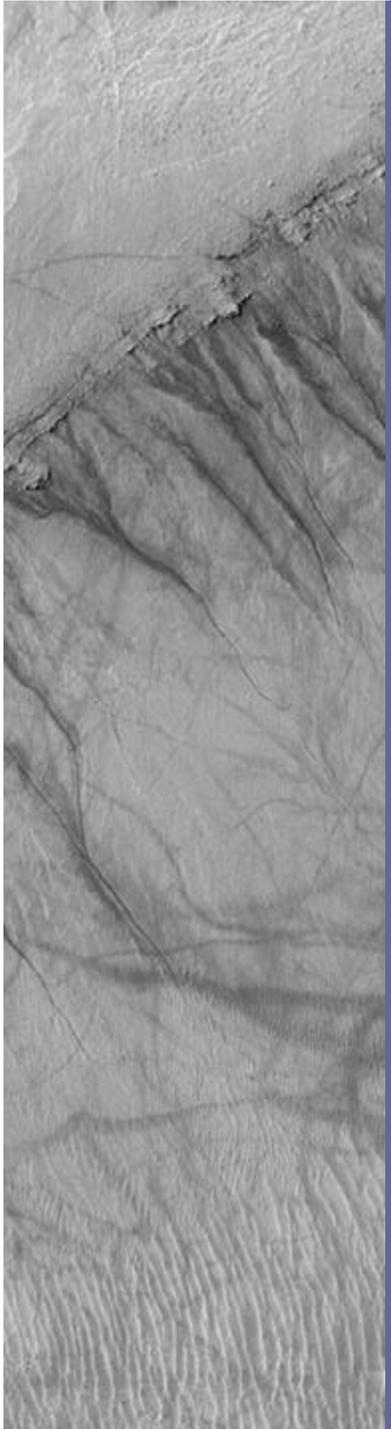




Rover Configuration (Deployed)



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Mars Science Laboratory
Pre-Proposal Conference

Available Documentation for
Proposers



Important Documentation for Proposal Teams

- The AO is primary guidance and takes precedence over all other documents.
- The PIP is second level source and takes precedence over other Applicable and Reference documents
- **The AO team has tried to keep the documents consistent, but.... in case of conflicts See above.**
- No Trick Questions... All Proposal requirements are *intended to be* stated in the AO and PIP (*incl. appendices*).
 - Some details are referenced/linked specifically from the AO and PIP (e.g., to specific MAP paragraphs), but;
 - There should be no “hidden” requirements in the supporting documents that aren’t pointed to by the AO or PIP
- **Please Help us help you: If you find conflicts, or orphan requirements, please send a question and we will correct/clarify the documentation.**

PRE-DECISIONAL DRAFT: For Planning and Discussion Purposes Only

The MSL Acquisition Program HomePage: <http://centauri.larc.nasa.gov/msl/>

Mars Science Laboratory Acquisition Program Homepage - Microsoft Internet Explorer

File Edit View Favorites Tools Help

 **Welcome to the**
Mars Science Laboratory (MSL) Acquisition Program 

| [Announcements](#) | **NEW** [AO](#) | [Mars Science Laboratory \(MSL\) Library](#) | [MSL AO Schedule](#) | **NEW** [Frequently Asked Questions \(FAQ\)](#) | [Preproposal Conference](#) | [NASA Privacy Statement](#) |

Introduction:

The NASA Mars Exploration Program (MEP) will launch a spaceflight mission to Mars in 2009 that will land a roving Mars Science Laboratory on the surface of the planet at a TBD location. The purpose of this mission is to explore and quantitatively assess Mars as a potential habitat for life, past or present. To maximize the science returned from this mission, NASA presently intends to solicit and competitively select science investigations to be carried on the rover. This website has been developed to provide information about this mission and other material to assist prospective proposers. For e... specific information about the Federal Business Opportunity (FBO) for the 2009 s... page guide users to additional useful sites such as the Mars Science Laboratory (MSL) Acquisition Library, Schedules, FAQ's (Frequently Asked Questions), etc.

You Are Here...

Author: [Wayne Richie \(w.richie@arc.nasa.gov\)](mailto:w.richie@arc.nasa.gov)
Earth & Space Science Support Office
Phone: (757)864-9863

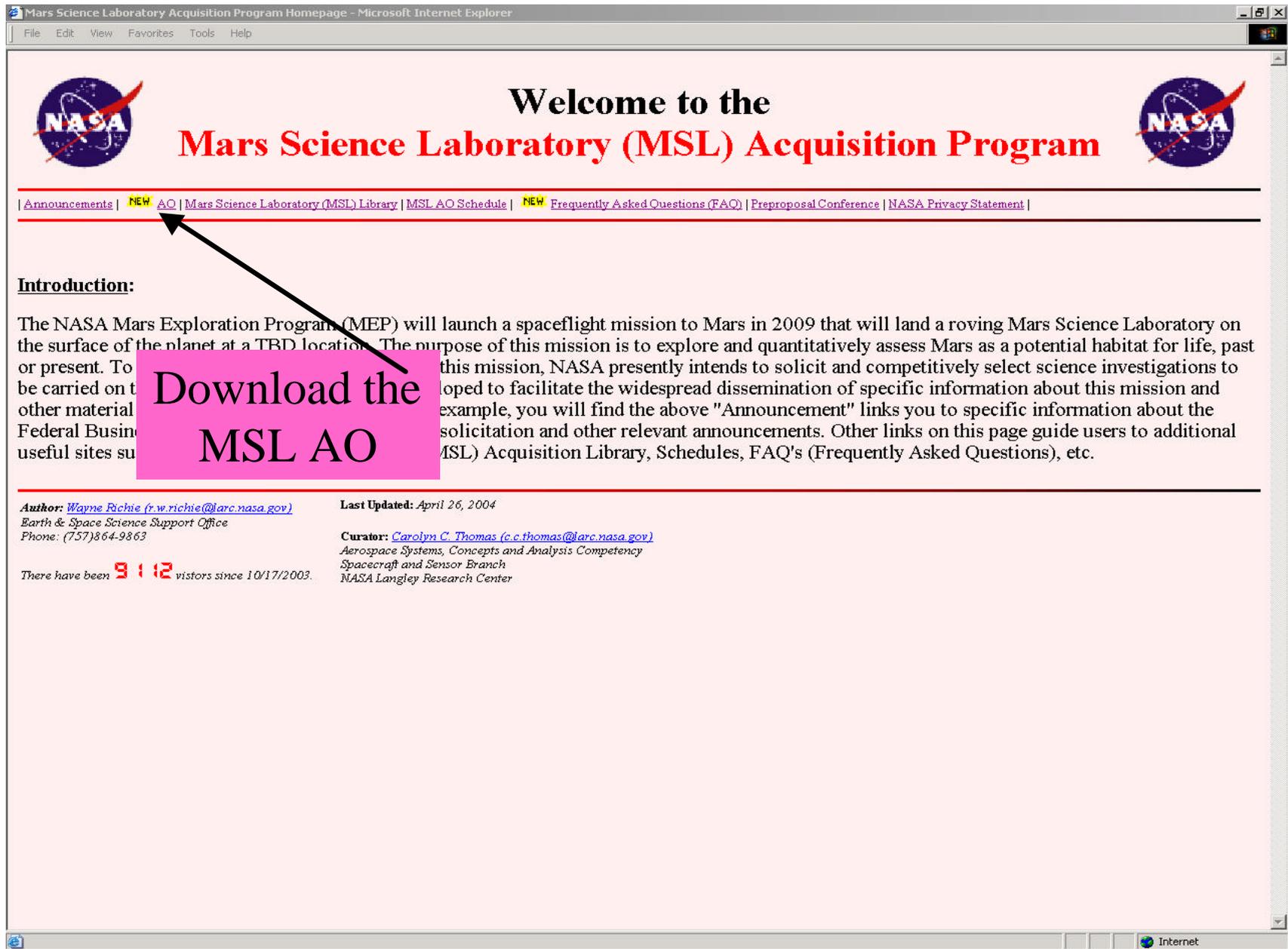
Last Updated: April 26, 2004

Curator: [Carolyn C. Thomas \(c.c.thomas@arc.nasa.gov\)](mailto:c.c.thomas@arc.nasa.gov)
Aerospace Systems, Concepts and Analysis Competency
Spacecraft and Sensor Branch
NASA Langley Research Center

There have been **9112** visitors since 10/17/2003.

Internet

http://centauri.larc.nasa.gov/msl/



Mars Science Laboratory Acquisition Program Homepage - Microsoft Internet Explorer

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Download the MSL AO

Author: [Wayne Richie \(w.richie@arc.nasa.gov\)](mailto:wayne.richie@arc.nasa.gov)
Earth & Space Science Support Office
Phone: (757)864-9863

Last Updated: April 26, 2004

Curator: [Carolyn C. Thomas \(c.c.thomas@arc.nasa.gov\)](mailto:carolyn.c.thomas@arc.nasa.gov)
Aerospace Systems, Concepts and Analysis Competency
Spacecraft and Sensor Branch
NASA Langley Research Center

There have been **912** visitors since 10/17/2003.

Internet

Download the MSL AO

The image consists of three overlapping screenshots from a Microsoft Internet Explorer browser window, illustrating the steps to download the MSL AO. The top-left screenshot shows a table of 'Open Submissions (Office of Space Science)' with columns for Program, Assessment Number, Submission Release Date, and Proposal Due Date. The top-right screenshot shows the full 'ANNOUNCEMENT OF OPPORTUNITY' document for 'Mars Science Laboratory Investigations', including the NASA logo and submission dates. The bottom screenshot shows a summary page for the 'Announcement of Opportunity Mars Science Laboratory Investigations' with a list of links for downloading the AO in PDF or HTML format. Arrows indicate the flow from the table to the summary page and then to the full document.

Program	Assessment Number	Submission Release Date	Proposal Due Date
Review of Opportunities (ROO) Mars Science Laboratory	MSL-AO-0001.0	14-Feb-04	24-Feb-04
Mars Science Laboratory Science Applications	MSL-AO-0002.0	24-Feb-04	14-May-04
Current Program 2004 and Mars Science Laboratory	MSL-AO-0003.0	19-Apr-04	14-May-04

ANNOUNCEMENT OF OPPORTUNITY
Mars Science Laboratory Investigations

Notice of Interest due: May 14, 2004
Proposal due: July 15, 2004

- MSL-AO-0001.0
- Download File Types
 - PDF File
 - HTML File

Mars Science Laboratory Acquisition Program Homepage - Microsoft Internet Explorer

File Edit View Favorites Tools Help



Welcome to the Mars Science Laboratory (MSL) Acquisition Program



[Announcements](#) | **NEW** [AO](#) | [Mars Science Laboratory \(MSL\) Library](#) | [MSL AO Schedule](#) | **NEW** [Frequently Asked Questions \(FAQ\)](#) | [Preproposal Conference](#) | [NASA Privacy Statement](#) |

Introduction:

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Go to the MSL Library

Author: [Wayne Richie \(w.richie@arc.nasa.gov\)](mailto:w.richie@arc.nasa.gov)
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Internet

The MSL Library Page (1 of 3)

Mars Science Laboratory Library - Microsoft Internet Explorer

File Edit View Favorites Tools Help

 **Mars Science Laboratory (MSL) Library** 

Mars Science Laboratory Acquisition Program

Update Log

April 16, 2004 - #11 Proposal Information Package (PIP) final version posted
Section 1.0: Delete files list of options being investigated that may affect instrument accommodation capabilities.
Further limit the volume available for instrument accommodation in the payload module
Section 2.1.4: Clarification of earliest landing date
Throughout: Hyperlinks updated and made active

April 13, 2004 - #4 OSS EPO Explanatory Guide replaced

April 5, 2004 - #12 Spectrae Contract replaced
#13 Contract Data Requirements List (CDRL) (Bibbit I) added
#14 Data Requirements Documents (DRD) (Bibbit II) added
#15 MSL Preliminary Mission Assessment Plan added
(Document numbers in previous updates greater than 12 have increased by 3)

April 5, 2004 - #11 Proposal Information Package (PIP) final version posted

February 17, 2004 - #12 Spectrae Contract added

February 12, 2004 - #14 and #17 had link change

February 9, 2004 - Documents added
#7 MEPAG Report on Scientific Goals, Objectives, Investigations, and Priorities: 2003
#10 Mars Exploration Strategy 2009-2020
#18 Report of the Organic Contamination Science Working Group

Office of Space Science Strategies and Policies

1. [The Space Science Enterprise 2003 Strategic Plan:](#)
This document is a concise statement of the goals and outlook of NASA's Space Science Enterprise.
2. [Partners in Education: A Strategy for Integrating Education and Public Outreach into NASA's Space Science Program](#)
This document describes the overall strategy for integrating education and public outreach into NASA's space science program.
3. [Implementing the Office of Space Science \(OSS\) Education/Public Outreach Strategy](#) (October 1996)
This document describes OSS's overall approach to implementing its Education/Public Outreach strategy.
4. [Explanatory Guide to the NASA Office of Space Science Education and Public Outreach Evaluation Criteria](#) (March 2004)
Answers to frequently asked questions, elaboration of each of the OSS EPO criteria. Document is intended to give a flavor of what exemplary EPO can be.
5. [OSS FY 2000, 2001 and 2002 EPO Annual Reports](#)
Describes the status of on going OSS EPO activities.

Mars Exploration Program Documents

6. [Mars Exploration Program Payload Analysis Group \(MEPAG\) Reports](#)
Science planning for Exploring Mars.

The MSL Library Page (2 of 3)

Mars Exploration Program Documents

6. [Mars Exploration Program/Payload Analysis Group \(MEPAG\) Reports](#)
Science planning for Exploring Mars.
7. [MEPAG Report on Scientific Goals, Objectives, Investigations, and Priorities: 2003](#)
8. [Mars Technology Program Overview](#) (November 2002)
Describes the Mars technology program and technologies being developed.
9. [Mars Program Public Engagement Plan](#) (April 2002)
Describes the Mars Program public outreach program.
10. [Mars Exploration Strategy 2009-2020](#) (April 18, 2003)

MSL Guidelines and Requirements Documents

11. [Proposal Information Package \(PIP\)](#) (April 2004)
Defines the technical and management information including schedules and cost needed to prepare a investigation proposal for the MSL PPO 2004.
 - o [MSL PIP Errata Log](#) (April 28, 2004)
12. [Specimen Contract.](#)
13. [Contract Data Requirements List \(CDRL\) \(Exhibit I\).](#)
14. [Data Requirements Documents \(DRD\) \(Exhibit II\).](#)
15. [MSL Preliminary Mission Assurance Plan.](#)
16. [Cost Element Definitions](#)
17. [Project Science Integration Group \(PSIG\) Report](#) (2003)
Defines options and prioritizations for science objectives for the MSL mission.

MSL Guidelines and Requirements Documents

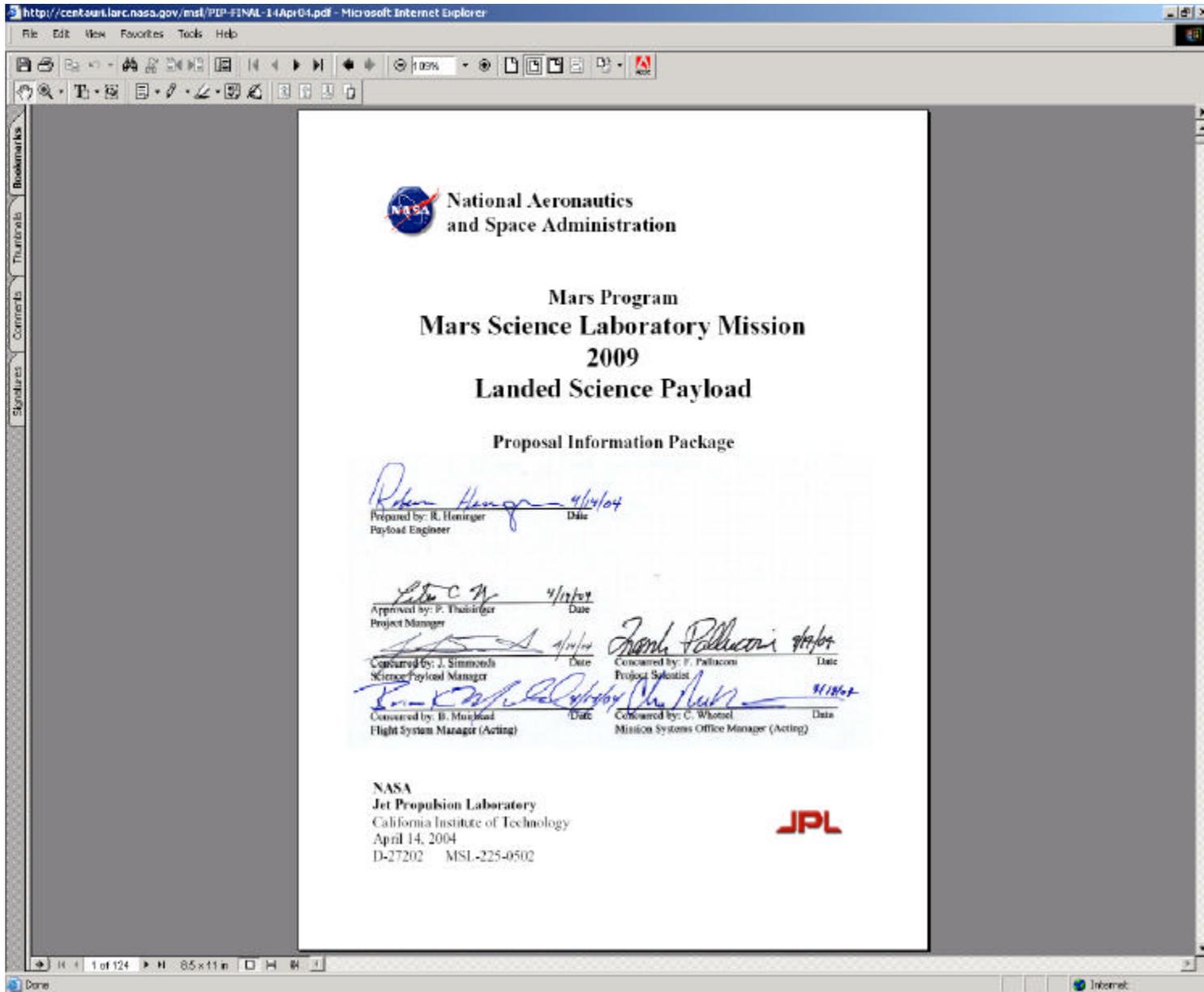
18. [NPG 7120.5B—NASA Program and Project Management Plan](#) (November 2002)
Provides a reference for typical activities, milestones, and deliverables for NASA missions.
19. [Planetary Data System Data Preparation Workbook](#) (April 2001).
Describes the basic formats and requirements used for the archiving of planetary data products by the Planetary Data System (PDS).
20. [Planetary Protection Requirements.](#)
Includes information on Planetary Protection Requirements for NASA spacecraft missions.
 - o [NPD8020.7F](#) (Biological Contamination Control For Outbound And Inbound Planetary Spacecraft)

MEP Documents
(MEPAG, MTP, etc.)

MSL Documents
(PIP, MAP, PSG,
Specimen Contract etc.)

Download the
MSL PIP

The MSL Proposal Information Package (1 of 2)



The MSL Library Page (3 of 3)

General Guideline and Requirements Documents

18. [NPG 7120.5B—NASA Program and Project Management Processes and Requirements](#) (November 2002)
Provides a reference for typical activities, milestones, and products in the development and execution of NASA missions.
19. [Planetary Data System Data Preparation Workbook](#) (April 2001)
Describes the basic formats and requirements used for the archiving of planetary data products by the Planetary Data System (PDS).
20. **Planetary Protection Requirements.**
Includes information on Planetary Protection Requirements for NASA spacecraft missions.
 - o [NPD8020.7E](#) (Biological Contamination Control For Outbound And Inbound Planetary Spacecraft)
[Version information: Effective Date February 19, 1999]
 - o [NPR 8020.12B](#) (Planetary Protection Provisions for Robotic Extraterrestrial Missions)
[Version information: Effective Date April 16, 1999]
 - o [NPG 5340.1D](#) (NASA Standard Procedures for the Microbiological Examination of Space Hardware)
[Version information: Final Review Draft dated January 10, 2000]
 - o [National Research Council \(NRC\). 1992. Biological Contamination of Mars: Issues and Recommendations](#)
 - o [National Research Council \(NRC\). 1997. Mars Sample Return Issues and Recommendations](#). Washington: National Academy Press.
 - o [National Research Council \(NRC\). 1998. Evaluating the Biological Potential in Samples Returned from Mars](#). Washington: National Academy Press.
 - o [Planetary Protection Requirements: COSPAR Planetary Protection Policy](#) (20 October 2002)
21. [Report of the Organic Contamination Science Steering Group](#) (December 3, 2003)

Directives and Procurement-related Information

Electronic versions of the latest releases only are available for the following:

22. [NASA Online Directives Information System \(NODIS\) III](#)
Provides online access to the NASA Policy Directives (NPD's - formerly NMT's), NASA Procedures and Guidelines (NPG's - formerly NHB's) and NASA's Policy Charters (NPC's).
23. [Federal Acquisition Regulations \(FAR\) General Services Administration](#)
Provides access to all FAR documents.
24. [NASA FAR Supplement Regulations](#)
Provides access to all NFS documents.
25. [NASA Financial Management Manual](#)
26. [NPG 5800.1D – Grant and Cooperative Agreement Handbook](#) (July 1996)

Other NASA
Reference Documents
(7120, PP, COSPAR,
OCSSG, etc.)

Other NASA
Regulations and
Directives (Reference)

Keeping Up to Date

The image shows a screenshot of the Mars Science Laboratory (MSL) Acquisition Program website. The page is titled "Welcome to the Mars Science Laboratory (MSL) Acquisition Program" and features the NASA logo. The main content area includes an "Introduction" section and a list of "MSL Guidelines and Requirements Documents".

Two callouts are present:

- A pink box with the text "Frequently Asked Questions" and an arrow pointing to the "Introduction" section.
- A pink box with the text "Errata (to PIP) and change pages" and an arrow pointing to the "MSL PIP Errata List" link in the list of documents.

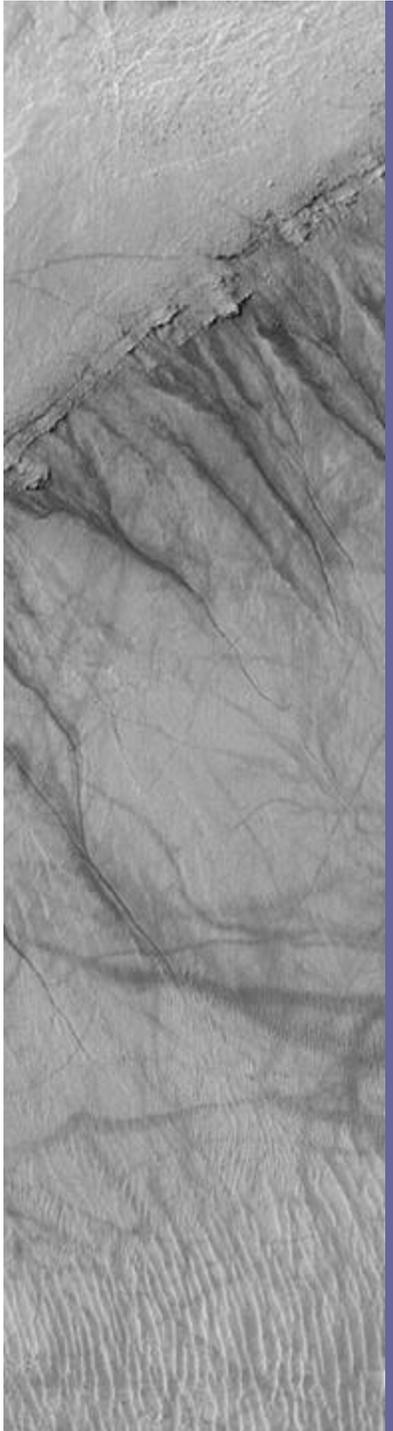
The list of documents includes:

11. [Proposal Information Package \(PIP\)](#) (April 2004)
Defines the technical and management information including schedules and cost needed to prepare a investigation proposal for the MSL AD 2004
 - o [MSL PIP Errata List](#) (April 28, 2004)
12. [Specimen Catalog](#)
13. [Contract Data Requirements List \(CDRL\) \(Exhibit D\)](#)

Other documents listed include:

- [Management Process and Requirements](#) (November 2002)
- 19. [Planetary Data System Data Preparation Workbook](#) (April 2001)
- 20. [Planetary Protection Requirements](#)
 - o [MPE 0020 7F](#) (Biological Contamination Control For Outbound And Inbound Planetary Spacecraft) [Version information: Effective Date February 19, 1999]
 - o [MPE 0020 12B](#) (Planetary Protection Provisions for Robotic Extraterrestrial Missions) [Version information: Effective Date April 16, 1999]
 - o [MPE 0340 1D](#) (NASA Standard Procedures for the Microbiological Examination of Space Hardware) [Version information: Final Review Draft dated January 10, 2000]
 - o [National Research Council \(NRC\). 1992. Biological Contamination of Mars. Issues and Recommendations.](#) Washington D.C.: National Academy Press.
 - o [National Research Council \(NRC\). 1997. Mars Sample Return Issues and Recommendations.](#) Washington D.C.: National Academy Press
 - o [National Research Council \(NRC\). 1998. Evaluating the Biological Potential in Samples Returned from Planetary Satellites and Small Solar System Bodies.](#) Washington D.C.: National Academy Press.

PRE-DECISION



Mars Science Laboratory
Pre-Proposal Conference

Notes on Proposal Content



Notes on Proposal Content and Uses by NASA

- Proposal content serves multiple purposes:
 - Primary,
 - Enable Evaluation of the Investigation's Science Content and Consistency with Mission Science Objectives;
 - Technical, Management, Cost and Other (TMCO) Factors Evaluation
 - Secondary,
 - Provide basis for Accommodation Assessment; and
 - Provide basis for quick establishment of Initial Contract with Selected PIs

– Different purposes drive the need for multiple inputs and formats of proposal information (e.g., costs formats in both overall and first four months; design descriptions vs. accommodation summaries, etc.)



Questions? Inconsistencies? Etc.?

Please send all questions via email to :

Michael Meyer <michael.a.meyer@nasa.gov>

- Questions are researched and answered by the AO Team and posted to the FAQ page on a regular basis.
- Questions are kept generic and Identity of questioner is withheld
- NOI Respondents will be notified via email of Web Page changes.