



Planetary Science Division Update

*Presentation at the
Planetary Science Subcommittee*

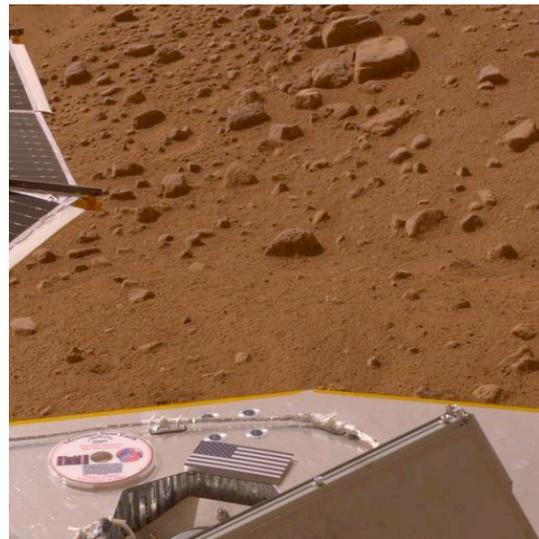
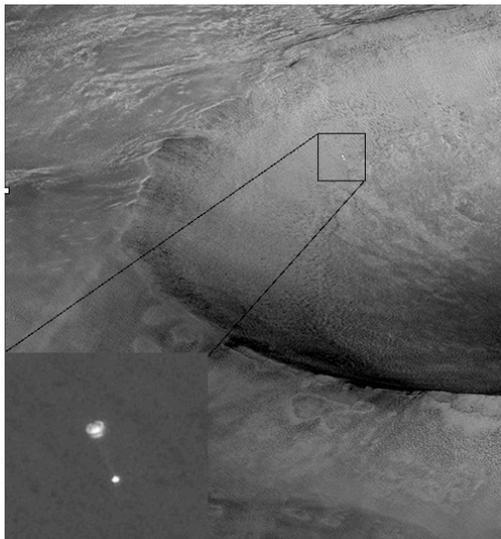
James L. Green
Director, Planetary Science Division

June 23, 2008

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Phoenix Landing and Operations



- Overview by Peter Smith (during noon hour)

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Outline

- Administration
- Upcoming Opportunities
- Mission Status and Plans
- Outer Planets Flagship status
- Lunar Program
- PSS Findings and Recommendations
 - Mars Exploration Program covered by Mike Meyer/Lisa May

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Administration

- Tom Morgan returning from detail at GSFC is our Lunar Program Scientist
- Loses:
 - Kurt Lindstrom: Program Exec. for LRO/LCROSS
 - John Rummel (Astrobiology) -Will advertise this vacancy
 - Denis Bogan (Cassini) - Will advertise this vacancy
- New Personnel:
 - Gordon Johnston: Program Executive for LRO/LCROSS
 - Joan Salute: Program Executive for LADEE
 - Len Dudzinski: Program Executive for Radio Isotope Power systems
 - Max Bernstein: Program Scientist

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New Academy Studies

- Congress: NASA will fund National Academy studies on:
 - R&A - Balance with missions
 - NEO - address issues in the detection and mitigation
 - Jointly requested by NASA and NSF

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Upcoming 2008 Opportunities

- NASA Lunar Science Institute Nodes
 - Released: June 2, 2008
 - Proposals Due: August 29, 2008
- Stand-Alone Mission of Opportunity Notification (SALMON)
 - Final release: ~August 1, 2008
 - Proposals Due: ~November 2008
 - Selections Announced: ~March 2009
- New Frontiers AO
 - Draft release: ~ September 2008
 - Final release: ~December 2008
 - Features:
 - PI certification have been dropped
 - Simplified AO requirements
- Discovery - under review

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NOSSE Recommendations and NF



- “Opening New Frontiers in Space: Choices for the Next New Frontiers AO” - NASA should:
 - R1: Emphasize science objectives
 - R2: Expand the list of candidate missions
 - R3: Limit to the list below unless compelling science
- Recommended target list in alphabetic order:
 - Asteroid Rover/Sample Return*
 - Comet Surface Sample Return
 - Ganymede Observer*
 - Io Observer*
 - Lunar South Pole Aitken Basin Sample Return
 - Network Science*
 - Trojan/Centaur Reconnaissance*
 - Venus In-Situ Explorer
- Report located at: <http://www.nap.edu/catalog/12175.html>
- NASA accepted recommendations 1 and 2
 - Established cost cap (\$650 w/o launch vehicle) and no RPS
 - No PI certification process

* Additions

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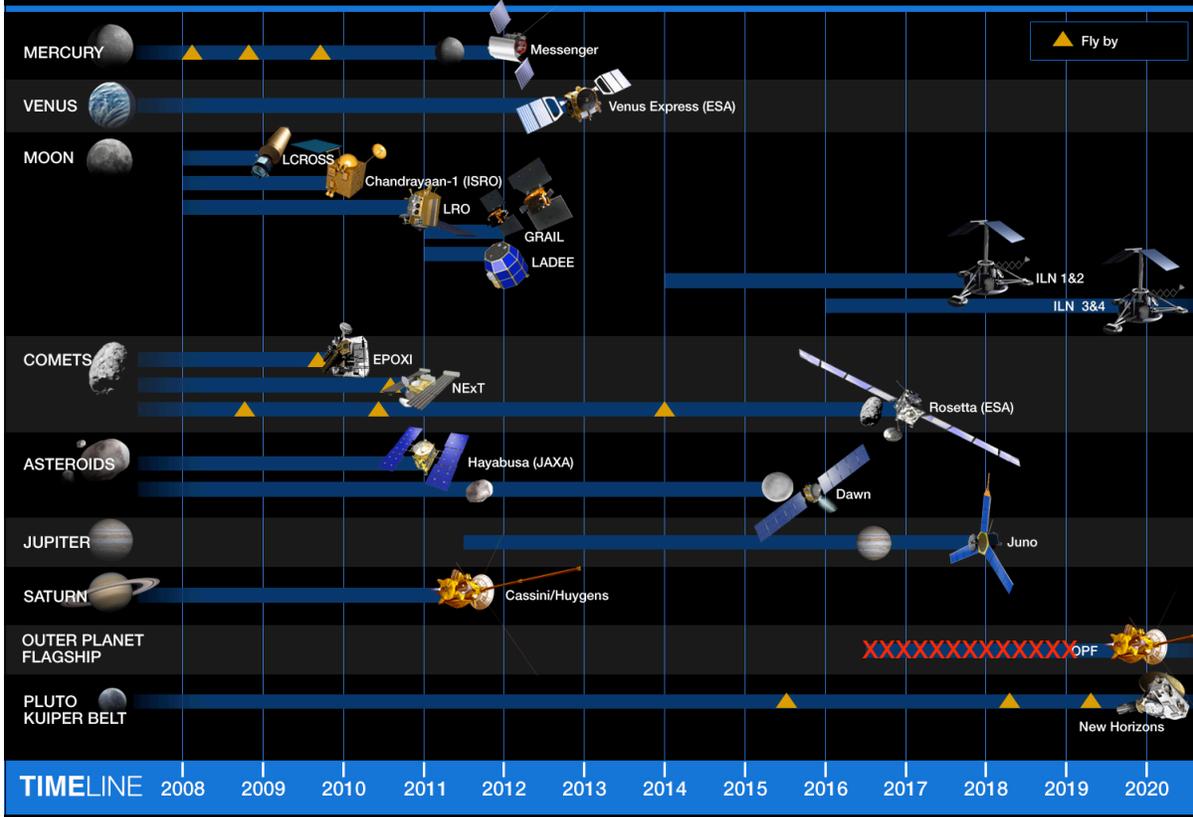
FY09 Passback Direction



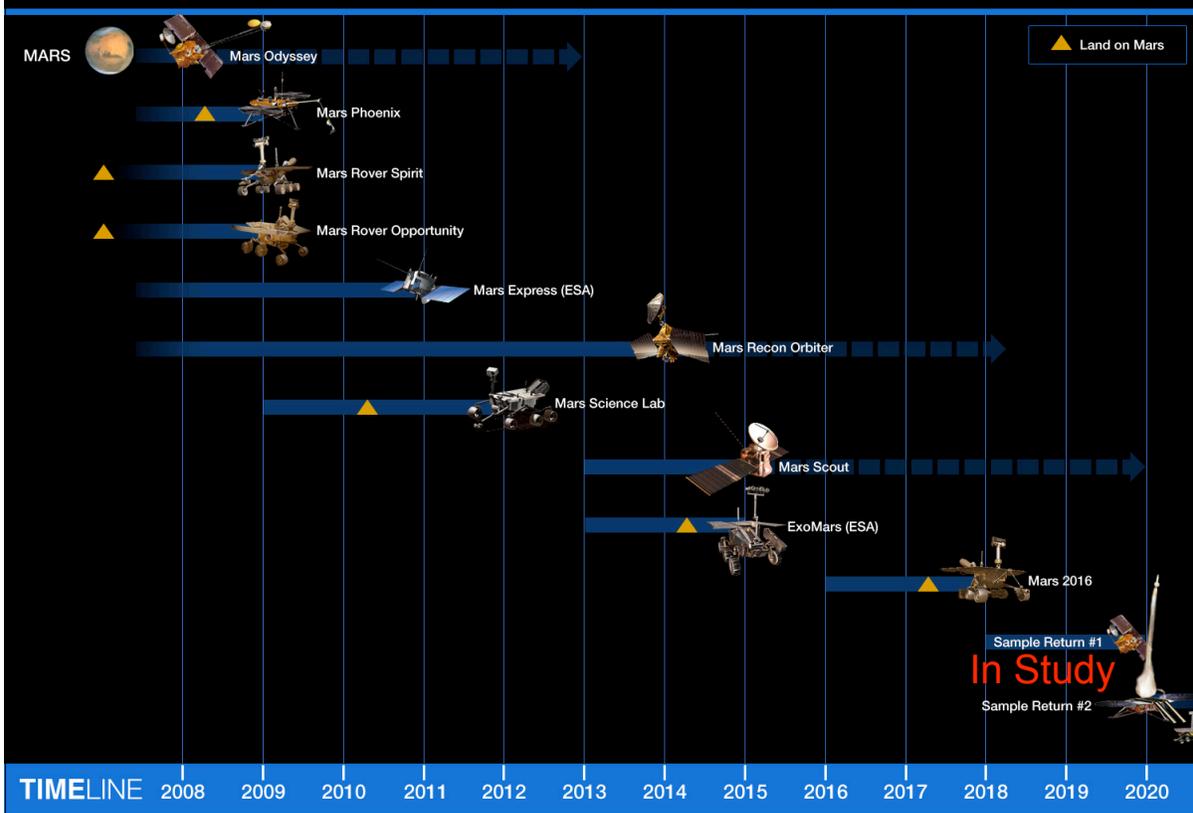
- “... expects NASA to execute the new initiatives and absorb their costs within the agency’s top line.”
 - Acceleration of new Earth science missions
 - Series of Lunar robotic missions
- Lunar research was established in FY08 with new funding for PSD
- In the five year budget projection:
 - “OMB... recommends that Science provide adequate funds within the budget to develop detailed cost estimates of the candidate [Mars] sample return concepts. NASA’s rollout materials should make clear to the Congress and the science community, and the public that the agency is not committing to but rather exploring over the next few years the possibility of conducting a MSR. NASA should [also] develop ...an exit strategy should NASA end up not pursuing MSR...”
 - “OMB is pleased that Science is planning to develop a flagship-class mission to the outer planets. We look forward to staying informed of the project’s development and urge Science to manage the project rigorously to control costs.”

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Non-Mars Planetary Mission timeline



Mars Mission timeline





Outer Planets Flagship

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Background



- Two studies in partnership with ESA
 - Europa Jupiter System Missions
 - Titan Saturn System Missions
- Initial NASA ground rules (January):
 - What science can be done with \$2.1B
 - Launch in 2016
- Revised ground rules (late March):
 - Find the “sweet spot” in the decadal science then recost
 - Characterize launch opportunities 2016-2022
 - Earliest ESA launch is 2018
- Interim report to NASA Hq (June 20)
 - Curt Niebur will review study results
 - Summary: \$2.1B provides a mission which shortchanges science and is therefore not acceptable

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Next Steps



- OPF is not a “done deal” there is long way to go
 - Major short comings in the FY09 NASA budget must be addressed
 - Build a creditable Mars program
- Mid-course correction for the OPF studies:
 - Studies to concentrate on costing the “sweet spot” science missions
 - Align schedule with ESA: 2018-2022 launch date
 - New schedule for delivery of study TBD
 - After delivery - evaluate and downselect
- Once science and budget aligned then replan PSD budget to determine if feasible
 - At this time a credible OPF mission can not be expected before 2020 without major sacrifices

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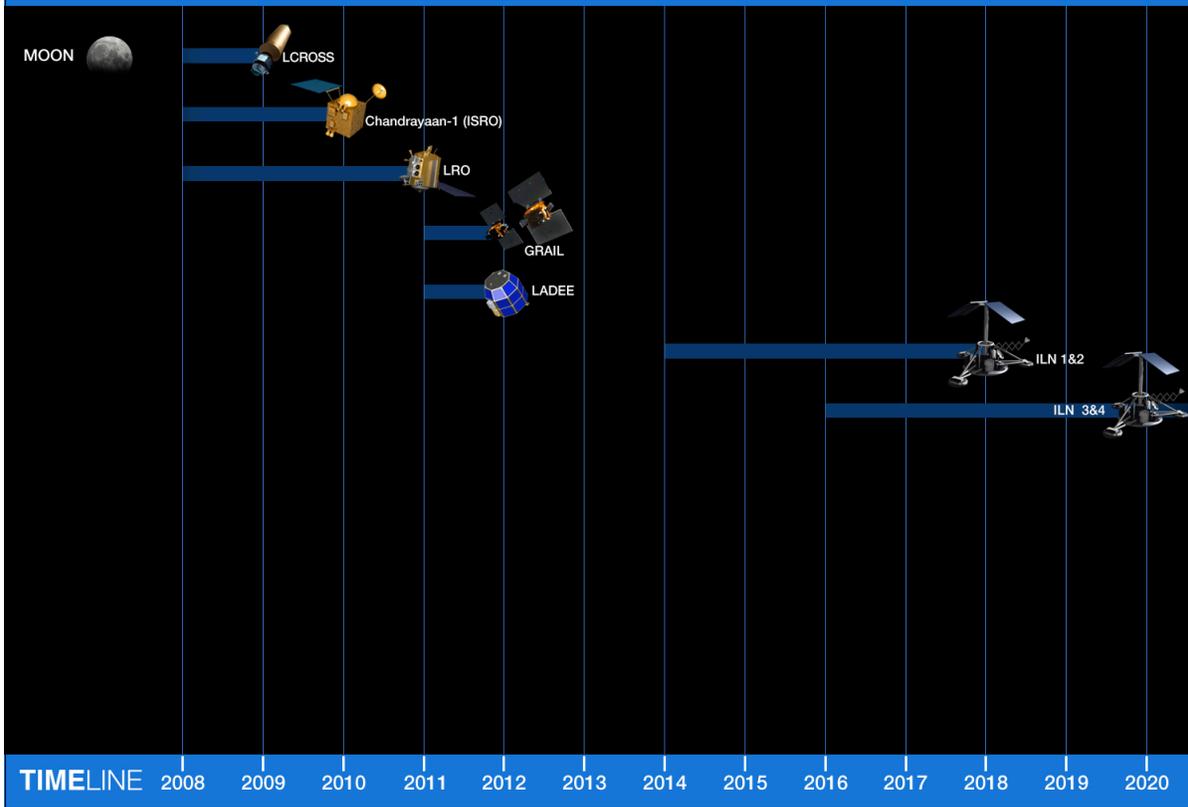
Lunar Missions Update



LRO, LCROSS, Grail, LADEE, ILN
M³(Chandrayaan-1)

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Lunar Mission timeline



Lunar Atmo. & Dust Environment Expl



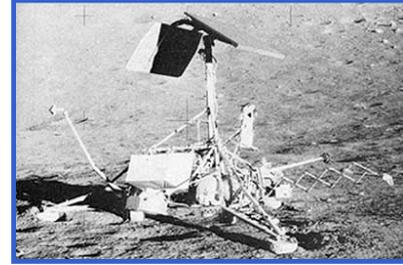
- LADEE: small strategic orbiter provided by ARC/GSFC measuring atm. & dust
 - Plan was for a launch in 2011 as secondary payload with Grail
 - Grail & LADEE accommodation study complete
 - Recommendation: *Fly separately*
- LADEE Science Definition Team Report released
 - Obj. 1: Determine the composition of the lunar atmosphere and investigate the processes that control its distribution and variability, including sources, sinks, and surface interactions
 - Obj. 2: Characterize the lunar exospheric dust environment and measure any spatial and temporal variability and impacts on the lunar atmosphere
 - Instruments: neutral mass spectrometer, an Ultraviolet/visible spectrometer, and an *in situ* dust detector



ILN Missions



- International Lunar Network (ILN)
 - First two ILN nodes 2013/2014
 - A second pair of ILN nodes in 2016/2017
- ILN is designed to emplace 6-8 stations on the lunar surface - fixed or mobile
- The U.S. is studying the option for a lunar comm relay orbiter enabling lunar far-side access for ILN nodes.
- Each ILN station:
 - Has a core set of instrument types (e.g., seismic, laser retro-reflector, heat flow) requiring broad geographical distribution
 - Could also include additional instruments as desired by the sponsoring space agency
 - Could also include additional passive, active, ISRU, or engineering experiments, as desired by each sponsoring space agency



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ILN Timeline

- February 12 – ILN Introductory Letters sent to Foreign Partners
- March 11 – Lunar and Planetary Science Conference (LPSC) Platform Presentation on the ILN Concept
- March 12 – ILN Kick-Off Meeting in Houston
 - 34 Participants from 9 Countries
- April 18 – Draft Statement of Intent (SOI) sent out for review
- April 30 – Teleconference #1
 - 50 Participants from 12 Countries and ESA
- June 9 – Teleconference #2
 - 38 Participants from 9 Countries
- July 20-23 – NLSI Lunar Science Conference
 - July 24 – ILN Face-to-Face Meeting at NLSI; Sign SOI: Begin the Core Instrument Working Group
- August - onward: Start other workgroup activity (ie: site selection)

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LASER-07 Statistics



	Submitted	Funded	Organization
Basic Science	55	26	SMD
Applied Science	75	7	ESMD
Mixed (Bas.+App.)	30	10	SMD & ESMD
Total	160	43	
Funds (Year 1)		\$3.5M	\$1.2M
Total Funds (4 Years)		\$10.1M	\$3.9M



The NSLI Lunar Science Conference, co-sponsored by the NASA Lunar Science Institute and the Lunar and Planetary Institute, will be held **July 20–23, 2008**, at the NASA Ames Conference Center, adjacent to NASA Ames Research Center, Moffett Field, California.

The conference will review the state of knowledge of, and opportunities for, science:
Of the Moon: Study the nature and history of the Moon (including research on lunar samples) and thereby provide insights into the evolution of our solar system;

On the Moon: Investigate the effects of the lunar environment on terrestrial life and the equipment that supports lunar inhabitants, and the effect on robotic and human presence on lunar environment;

From the Moon: Use the Moon as a platform for performing scientific investigations, including observations of the Earth and other celestial phenomena that are uniquely enabled by being on the lunar surface.



PSS Findings and Recommendations

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Recommendation #1

- Take steps to develop or ensure the availability of long-lived power supplies for landed networks and other planetary missions

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Response



- PSD looking for flight opportunity for 2 Stirling engines
- PSD has identified the need for a RPS for power in the 10-100 W_e range
 - Planned International Lunar Network nodes require power through the lunar night
 - Potential Mars seismic network nodes also require power in dim sunlight regions
 - Potential Titan in-situ mission elements require long-term power distant from Sun
- NASA is working with DoE to plan for the development of a new, small RPS
 - Will seek concepts for 10-100 W_e RPS thru an RFI
 - Ground rules: 2013 IOC with Little or no technology development
 - SDT & Users Workshop will seek mission concepts requiring small RPS to understand multi-mission requirements
 - RFP for small-RPS development will be released once requirements are determined

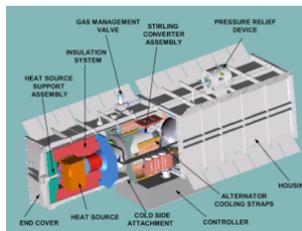
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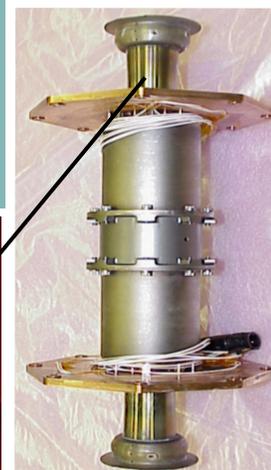
Advanced Stirling Radioisotope Generator Engineering Unit



- Operation in space and on surface of atmosphere-bearing planets and moons
- Characteristics:
 - ≥ 14 year lifetime
 - Nominal power : 140 W_e
 - Mass ~ 20 kg
 - System efficiency: ~ 30 %
 - 2 GPHS (“Pu²³⁸ Bricks”) modules
 - Uses 0.8 kg Pu²³⁸
- Final wiring and connections for ASRG engineering unit underway
- Reliability to be demonstrated by the end of 2009



Lockheed Martin/Sunpower



Paired converters with interconnect sleeve assembly



Outboard Housing and Paired ASC-Es

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DSMCE Program Overview



- Program solicited mission concept proposals for small planetary missions that require the ASRG power source
 - Two Stirling Engines with ~140 Watts each (as GFE)
- Intended to foster science exploration in planetary science by missions enabled by ASRG
- Mission design assistance for these 6 month mission concept studies will be offered by NASA
- Selected 9 proposals
 - 40 proposals submitted with average budget of \$271K
 - NRA directed proposers to budget \$200,000-\$300,000

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DSMCE Selections



Baines, Kevin	JPL	Venus	Aerial Vehicle	Polar VALOR: The Feasibility of A Nuclear-Powered Long-Duration Balloon Mission to Explore the Poles of Venus
Elphic, Richard	Los Alamos National Laboratory	Moon	Lander	Locating and Characterizing Lunar Polar Volatiles: Feasibility of a Discovery-Class Mission
Jolliff, Bradley	Washington University	Moon	Rover	Journey to the land of Eternal Darkness and Ice (JEDI): A Lunar Polar Volatile Explorer
Rivkin, Andrew	Applied Physics Lab	Asteroid	Lander	Ilion: An ASRG-Enabled Trojan Asteroid Mission Concept
Hecht, Michael	JPL	Mars	Lander	A tour through Martian history: An ASRG-powered polar ice borehole.
Stofan, Ellen	Proxemy Research	Outer Planets	Lander	Titan Mare Explorer (TiME)
McEwen, Alfred	University of Arizona	Outer Planets	Orbiter	Mission Concept: Io Volcano Observer (IVO)
Sandford, Scott	NASA/AMES	Comet	Sample Return	Concept Study for a Comet Coma Rendezvous Sample Return Mission
Sunshine, Jessica	Univeristy of Maryland	Comet	Lander	Comet Hopper

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Recommendation #2

- NASA make every effort to solve MSL's cost growth problems in 2008 and 2009 so that the mission may remain on schedule for its 2009 launch.

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MSL Status

- Currently on schedule for September 2009 launch but not "out of the woods"
 - Regular reviews and key decision dates still ahead
- Project MSL cost overrun ~\$190M over 2 fiscal years
- FY 2008, \$115M
 - \$20.3M Mars Program - uncosted carryover reduction and eliminating all program reserve
 - \$35.7M Planetary Programs – funding profile rephasing and reduced projects unobligated and uncosted carryover funds
 - \$59.0M w/in other SMD programs – reduced projects' unobligated and uncosted carryover funds w/out impacting programmatic schedule and contents
- FY 2009, \$75M – sources to be decided and finalized in early October

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Recommendation #3



- NASA take the necessary budgetary, partnering, and planning steps - including needed strategically linked precursor missions - to enable the launch of a Mars Sample Return mission by 2020
- Response: Next Presentation will address this - Mars Exploration Program - Next Decade Planning - Mike Meyer/Lisa May

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