



Planetary Science Division Status

Jim Adams

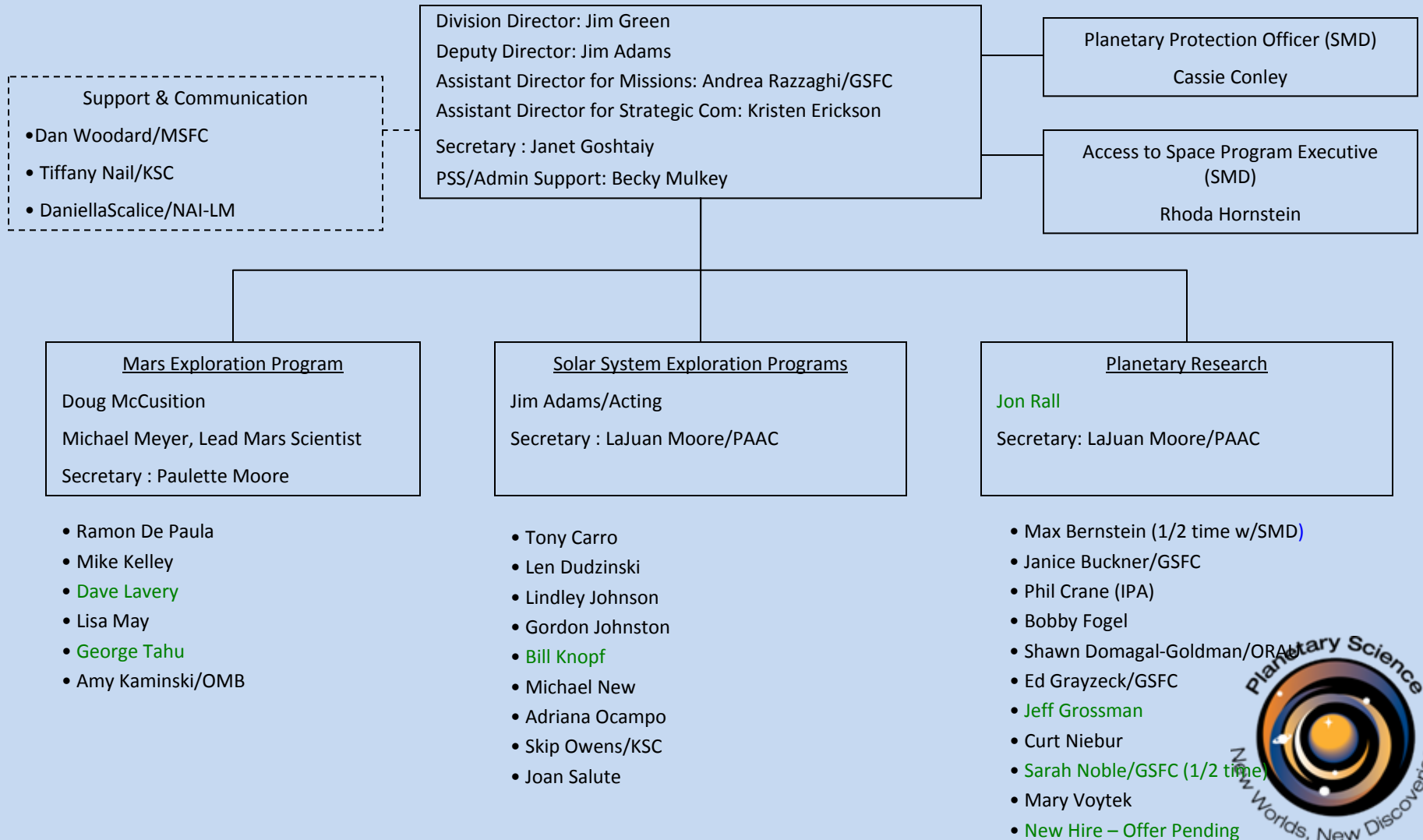
September 14, 2010





Planetary Science Division

Significant Changes





Program Update

- Decadal Survey on Track for Release
 - Spring 2011
- Lunar Quest passed independent review!
 - APMC in January 2010
- New Frontiers-3 Continues Toward Downselection in mid-2011
 - Includes Lunar SPA Sample Return
- Discovery-12 Proposals are in!





Decadal Survey Notional Schedule

- Final Steering Group meeting in D.C.—3-4 August
- Report to Reviewers—September/October
- Report revised—November-January
- Report approved for release—January/February
- Edit and produce prepub. report—February/March
- Embargoed report to NASA/NSF—late-February
- Briefings to NASA, NSF, etc.—late-February/March
- Public release of prepub. at LPSC—early-March
- Additional briefings—March-August
- Print and disseminate printed report— <31 August
- End of Project—31 August 2011





PLANETARY SCIENCE DIVISION “SR&T” ACTIVITIES

A Study by the NAC Planetary Science Subcommittee

- January 2010 NRC issued – Mission Enabling Report: NASA should ensure that SMD mission-enabling activities are linked to the strategic goals of the Agency and of SMD/PSD. NASA should develop and implement an approach to actively managing its portfolio of mission-enabling activities
- Supporting Research and Technology (SR&T) activities are critical in enabling the strategic goals of the Planetary Science Division (PSD) to be meet.
- The NAC Planetary Sciences Subcommittee (PSS) has initiated a study of the SR&T and related activities to: *assess program relevance and effectiveness, and to suggest possible improvements in program management.*
- The study results will lead to recommendations to the PSD Director through the NAC Science Committee in late Summer 2011.
- More detail in PEN (Planetary Exploration Newsletter) this weekend.





PLANETARY SCIENCE DIVISION “SR&T” ACTIVITIES

A Study by the NAC Planetary Science Subcommittee

Study Members:

Ron Greeley (Chair PSS)* <i>Study Working Group Chair</i>	<i>Ariz. State Univ.</i>	Bill McKinnon (OPAG Chr)	<i>Wash. Univ.</i>
Jim Bell*	<i>Cornell</i>	Louise Prockter	<i>APL</i>
Julie Castillo	<i>JPL</i>	Anna Louise Reysenbach	<i>Portland State U.</i>
Tom Cravens*	<i>Univ. Kansas</i>	Chip Shearer (LEAG Chr)	<i>Univ. N. Mex.</i>
Dave DesMarais (MEPAG Chr)	<i>NASA-Ames</i>	James Slavin	<i>NASA-Goddard</i>
John Grant*	<i>NASM</i>	Paul Steffes	<i>Georgia Tech</i>
Will Grundy	<i>Lowell Obs.</i>	Dawn Sumner*	<i>Univ. Calif. Davis</i>
Greg Herzog	<i>Rutgers</i>	Jessica Sunshine	<i>Univ. Maryland</i>
Jeff Johnson	<i>USGS Flagstaff</i>	Mark Sykes (SBAG Chr)*	<i>Plan. Sci. Inst.</i>
Sanjay Limaye (VExAGChr)*	<i>Univ. Wisc.</i>	Mini Wadhwa (CAPTEM Chr)*	<i>Ariz. State Univ.</i>

***Working Group members**

Plus ex officio and executive secretary members provided from PSD

Plus possible community members





Projects

- GRAIL-A Powered up successfully
 - Mission is on track for September 2011 Launch
- LRO is now an SMD Science mission
 - Emphasis moves from Mapping and Resources to Science
 - Bombardment history
 - Geologic Processes and Regolith
 - Volatile Transfer Processes
 - Space Environment/Surface Interactions
- LADEE Confirmed
 - Launch Readiness Date May/July 2013
- Artemis inserted into Lunar L2
 - PSD support pending further analysis of orbits as recommended from Senior Review





Technology

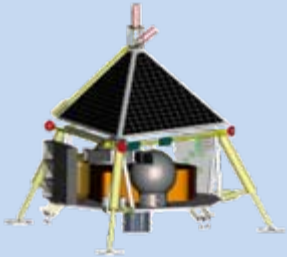
- Since 2008, SMD has been performing extensive engineering trades, analyses, technology development, and tests to reduce the risk in the development of small robotic lunar (or airless body) landers.
- The biggest challenges to achieving the reduced mass & power that enables a highly-capable small lander, lie in the propulsion, thermal control, and avionics subsystems. Some highlighted accomplishments in those areas include:
 - Successfully completed hot-fire tests of 100-lbs class high thrust-to-weight thrusters
 - ~1/10 the mass and volume of conventional thrusters
 - Beginning the hot-fire tests of 5-lbs class attitude control thrusters tomorrow
 - Variable link thermal management system(s)
 - Development and Test on-going
 - To meet the challenge of surviving the extremes of the lunar thermal environment for long duration missions (years) at equatorial and polar sites.
 - Testing low-power high speed avionics processors
 - Performing hardware-in-the-loop validation
 - Testing of landing algorithms via free-flying autonomous lander test beds.





Incremental Development of Robotic Lander Test Bed -- Progress

Pre-Phase A Flight Lander Design Concept - funded



Capabilities

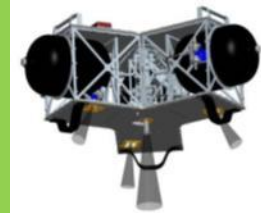
- Small lander class
- Survive lunar environment in mid to high latitude, near and far side.
- Operate continuously for 6 years

Results

- Solar Array Battery design concept deemed feasible
- ASRG design concept deemed feasible

Completed

Cold Gas Test Article funded



Capabilities

- 10s total flight time
- Autonomous control
- Supports ascend/descend and release and descend (3m) flight profiles
- Utilizes flight-like IMU as sole sensor
- Numerous flights per day

Results

- Over 100 test flights
- Validates original ILN thruster configuration (pulsed descent thrusters, uncoupled ACS thrusters)
- Work on-going to validate flight velocity-based control algorithms and modular software architecture

Completed

(9 months)

Warm Gas Test Article funded



Capabilities

- Approx. 1min flight time
- Autonomous control
- Supports ascend /descend, release and descend (30m), and translation flight profiles
- Utilizes flight-like sensor suite (IMU, radar altimeter, optical velocity determination)
- Avionics accommodates candidate flight processors (RAD750, Maxwell, LEON3)
- Multiple flights per day

Expected Results

- Validation of flight control algorithms over long duration
- Validation of modular software implementation using flight ground system and flight-like HW
- Validation of optical flow velocity determination

(15 months)





Upcoming Events

2010

September 10 -- 25th Anniversary of the First Comet Encounter, Newseum

September 16 – LRO Begins it's SMD Mission

October 14 – 50th Anniversary of Astrobiology

November 4 - EPOXI encounters comet Hartley 2

November 15 - Launch of O/OREOS

December 7- Venus Climate Orbiter (JAXA) arrives at Venus

2011

Early 2011 -- Mars Opportunity Rover gets to Endeavour Crater

February 14 - Stardust NExT encounters comet Tempel-1

March 18 - MESSENGER orbit insertion at Mercury

July - Dawn orbit insertion at asteroid Vesta

August - Juno launch to Jupiter

September - GRAIL launch to the Moon

November - MSL launch to Mars

2012

Mid-year -- Dawn leaves Vesta starts on its journey to Ceres

August - MSL lands on Mars

2013

May/July -- LADEE launch to the Moon





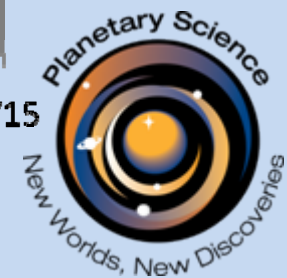
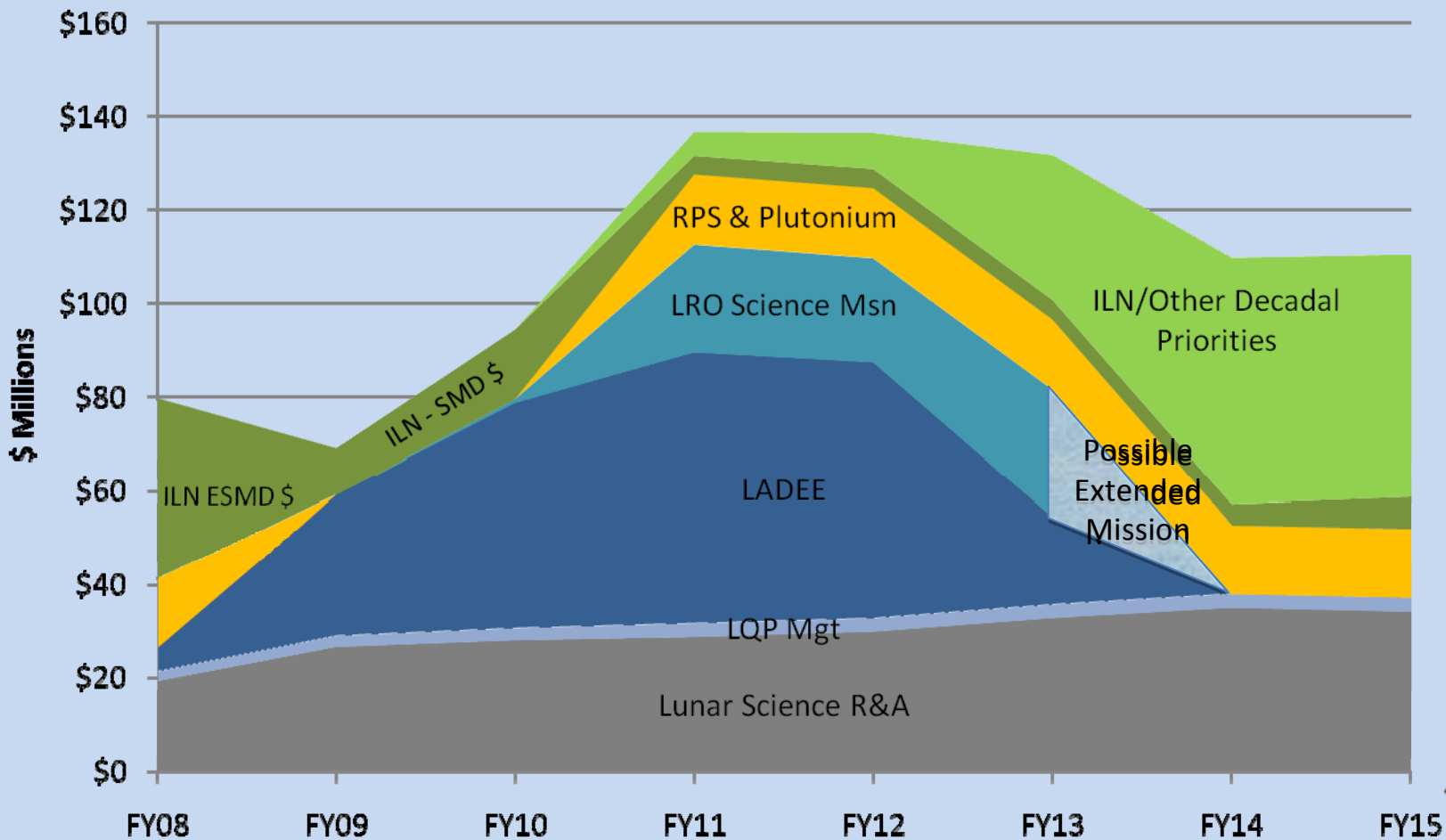
Back Up





Lunar Quest Program

FY 2011 President's Budget





PLANETARY SCIENCE DIVISION “SR&T” ACTIVITIES

A Study by the NAC Planetary Science Subcommittee

The Study will do:

- Map the activities through "traceability paths" from *PSD goals* to specific programs for relevance, results, and worth; **GOALS:**
 - *Inventory solar system objects and processes*
 - *Understand origin and evolution of objects*
 - *Understand habitability of Mars and other bodies*
 - *Understand origin and evolution of life on Earth and potentially elsewhere*
 - *Study small bodies as threats/resources*
- Current activities to support these goals (excluding flight programs and technology development) are
 - *ROSES programs*
 - *SALMON: Participating Scientists*
 - *Planetary Data System*
 - *Astromaterials Curation (JSC)*
 - *Astrobiology Institute (ARC)*
 - *Lunar Science Institute (ARC)*
 - *Infrastructure (e.g., Planetary Cartography, USGS)*
- Derive recommendations regarding "active portfolio management" to meet *PSD goals*

