Planetary Science Division Status

Jim Adams

September 14, 2010
Planetary Science Division

Significant Changes

Division Director: Jim Green
Deputy Director: Jim Adams
Assistant Director for Missions: Andrea Razzaghi/GSFC
Assistant Director for Strategic Com: Kristen Erickson
Secretary: Janet Goshtaiy
PSS/Admin Support: Becky Mulkey

Mars Exploration Program
Doug McCusition
Michael Meyer, Lead Mars Scientist
Secretary: Paulette Moore

Solar System Exploration Programs
Jim Adams/Acting
Secretary: LaJuan Moore/PAAC

Planetary Research
Jon Rall
Secretary: LaJuan Moore/PAAC

Support & Communication
Dan Woodard/MSFC
Tiffany Nail/KSC
Daniella Scalise/NAI-LM

Planetary Protection Officer (SMD)
Cassie Conley
Access to Space Program Executive (SMD)
Rhoda Hornstein

Mars Exploration Program:
• Ramon De Paula
• Mike Kelley
• Dave Lavery
• Lisa May
• George Tahu
• Amy Kaminski/OMB

Solar System Exploration Programs:
• Tony Carro
• Len Dudzinski
• Lindley Johnson
• Gordon Johnston
• Bill Knopf
• Michael New
• Adriana Ocampo
• Skip Owens/KSC
• Joan Salute

Planetary Research:
• Max Bernstein (1/2 time w/SMD)
• Janice Buckner/GSFC
• Phil Crane (IPA)
• Bobby Fogel
• Shawn Domagal-Goldman/ORAU
• Ed Grayzeck/GSFC
• Jeff Grossman
• Curt Niebur
• Sarah Noble/GSFC (1/2 time)
• Mary Voytek
• New Hire – Offer Pending

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Cassie Conley

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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
• 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.
Study Members:

Ron Greeley (Chair PSS)*  
  *Study Working Group Chair  
Jim Bell*  
Julie Castillo  
Tom Cravens*  
Dave DesMarais (MEPAG Chr)  
John Grant*  
Will Grundy  
Greg Herzog  
Jeff Johnson  
Sanjay Limaye (VExAGChr)*

Bill McKinnon (OPAG Chr)  
Louise Prockter*  
Anna Louise Reysenbach  
Chip Shearer (LEAG Chr)  
James Slavin  
Paul Steffes  
Dawn Sumner*  
Jessica Sunshine  
Mark Sykes (SBAG Chr)*  
Mini Wadhwa (CAPTEM Chr)*  

*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

**Completed (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

Possible Extended Mission
Possible ILN/Other Decadal Priorities
RPS & Plutonium
LRO Science Msn
ILN - SMD $
ILN ESMD $
LADEE
LQP Mgt
Lunar Science R&A
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
  • AstromaterialsCuration (JSC)
  • Astrobiology Institute (ARC)
  • Lunar Science Institute (ARC)
  • Infrastructure (e.g., Planetary Cartography, USGS)

• Derive recommendations regarding "active portfolio management" to meet PSD goals