Planetary Science Decadal

Presentation to LEAG

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November 16, 2009
PSD Decadal Perspective

• Decadal results are shared between NASA & NSF with clear roles and responsibilities
  – NASA has space-based planetary science
  – NSF has ground-based planetary science
• Must be a fully integrated view of the entire solar system
  – Moon, Mars, and the rest of the solar system
  – Its is all about setting priorities not expectations
• Must also address planetary science within human exploration as it evolves (late in the next decade)
• Must address all aspects of the program
  – Sections on R&A and key technologies are important
• Budget and Technical reality
  - Program must fit within the known planetary budget
  - Use the FY11 Presidents budget after it is announced in February 2010
What will the Report Address?

- **Major Tasks:**
  - Overview of planetary science and current state of knowledge
  - Inventory of the key scientific questions
  - Assessment of NSF-funded infrastructure
  - Recommendations on program balance:
    - Mix of mission targets
    - Mix of mission sizes
    - Research activities
  - Prioritized recommendations for New Frontiers and flagship missions for the next decade
  - Recommendations for NASA-funded research activities
  - Recommendations for technology development

- **Scope**
  - Ground- and space-based planetary science
  - Astrobiology
Decadal Survey Organization

Steering Committee
Steve Squyres, Chair
Larry Soderblom Vice Chair
Vice Chairs of Panels

Inner Planets Panel
Ellen Stofan, Chair
Steve Mackwell, Vice Chair

Giant Planets Panel
Heidi Hammel, Chair
Amy Simon-Miller, Vice Chair

Primitive Bodies Panel
Joe Veverka, Chair
Harry Y. McSween, Vice Chair

Mars Panel
Phil Christensen Chair
Wendy Calvin Vice Chair

Satellites Panel
John Spencer, Chair
David Stevenson, Vice Chair
Inner Planets Panel

- Ellen Stofan, Proxemy Research, **Chair**
- Steve Mackwell, Lunar and Planetary Institute, **Vice chair**
- Ayana Howard, Georgia Institute of Technology
- Douglas Stetson, Space Science and Exploration Consulting Group
- Barbara Cohen, NASA Marshall Space Flight Center
- Martha Gilmore, Wesleyan University
- Alan Treiman, Lunar and Planetary Institute
- Steven Hauck, Case Western Reserve University
- Charles Shearer, University of New Mexico
- Edward Stolper, California Institute of Technology
- Lori Glaze, NASA Goddard Space Flight Center
- David Grinspoon, Denver Museum of Nature and Science
POC & Mission Studies

• PSD has assigned a HQ CS to be a “point of contact” for each panel
  – Steering Panel – Jim Green
  – Inner Planets Panel – George Tahu
  – Giant Planets Panel – Len Dudzinski
  – Mars Panel – Lisa May
  – Primitive Bodies Panel – Lindley Johnson
  – Satellites Panel – Curt Niebur

• Key Centers (JPL, GSFC, APL) have been selected to participate in the analysis of decadal missions by using their capabilities to develop a mission architecture that “closes” and results in a “realistic” cost
  – Provides specific analysis & supporting documentation to the Decadal Steering panel and to the NRC contract cost reviewer
Overall Schedule 2008-2011

2008

4th Quarter  Informal request received, NRC approves initiation,
Formal request received, Proposal to NASA.

2009

1st Quarter  Funding received, Chair identified,
Chair and vice chair appointed

2nd Quarter  Steering Group appointed, Panels Appointed

3rd Quarter  Meetings of the Steering Group and Panels begin

4th Quarter  Panels’ period of peak activity

2010

1st- 2nd Quarter  Final Panel meetings, Panel reports finalized

2nd-3rd Quarter  Prioritization and drafting of survey report

4th Quarter  Draft survey report to reviewers, Report revised

2011

1st Quarter  Report approved, NASA briefed
and report released (prepublication-format)

3rd Quarter  Printed report released
Studies Under Way

- **Full Mission Studies:**
  - Mars trace gas orbiter mission (GSFC)
  - Titan lake mission (JPL)

- **Rapid Mission Architecture Studies:**
  - Mercury lander mission (APL)
  - Venus near-surface mobile explorer mission (GSFC)
  - Uranus system mission (APL)
  - Neptune/Triton mission (JPL)
  - Enceladus flyby/sample return mission (JPL)

- **Other Studies:**
  - Mars 2018 skycrane capabilities study (JPL)
    - Explore the full range of science that could be delivered in 2018
  - NEO target study (JPL)
    - Assess the top 10 available NEO targets that could be reached with a low-thrust (electric propulsion) spacecraft
    - The top 3 targets to show how many flyby options might be available while still satisfying the constraints of the primary mission target and timeline
What’s Coming Up for PSD

2010
• May – Launch of O/OREOS
• June 13 - Hayabusa (JAXA) asteroid sample return
• July 10 – Rosetta (ESA) closest approach for Lutetia
• Sept – LRO transitions to Planetary Science Division
• Nov 4 - EPOXI encounters comet Hartley 2
• Late ‘10- Early ‘11 – Opportunity gets to Endurance (?)

2011
• Feb 14 - Stardust NExT encounters comet Tempel-1
• Mar 18 - MESSENGER orbit insertion at Mercury
• July - Dawn orbit insertion at asteroid Vesta
• Aug - Juno launch to Jupiter
• Sept - GRAIL launch to the Moon
• Oct - MSL launch to Mars

2012
• Jan-Feb – Dawn leaves Vesta starts on its journey to Ceres
• May - LADEE launch to the Moon
• Aug - MSL lands on Mars
NASA’s Planetary Science

Advance scientific knowledge of the origin and history of the solar system, the potential for life elsewhere, and the hazards and resources present as humans explore space

“Flyby, Orbit, Land, Rove, and Return Samples”
Steering Group

- Steven W. Squyres, Cornell University, Chair
- Laurence A. Soderblom, U.S. Geological Survey, Vice Chair
- Wendy M. Calvin, University of Nevada, Reno
- Dale Cruikshank, NASA Ames Research Center
- Pascale Ehrenfreund, George Wash U & Leiden Institute of Chemistry
- G. Scott Hubbard, Stanford University
- Wesley T. Huntress, Jr., Carnegie Institution of Washington
- Margaret G. Kivelson, University of California, Los Angeles
- B. Gentry Lee, Jet Propulsion Laboratory
- Jane Luu, Massachusetts Institute of Technology, Lincoln Laboratory
- Stephen Mackwell, Lunar and Planetary Institute
- Ralph L. McNutt, Jr., Johns Hopkins University, Applied Physics Lab
- Harry Y. McSween, Jr., University of Tennessee, Knoxville
- Amy Simon-Miller, NASA Goddard Space Flight Center
- David J. Stevenson, California Institute of Technology
- A. Thomas Young, Lockheed Martin Corporation (Retired)
Giant Planets Panel

- Heidi Hammel, Planetary Science Institute, Chair
- Amy Simon-Miller, NASA Goddard Space Flight Center, Vice Chair
- Reta Beebe, New Mexico State University
- John Casani, Jet Propulsion Laboratory
- John Clark, Boston University
- Brigette Hesman, National Radio Astronomy Observatory
- William Hubbard, University of Arizona
- Mark Marley, NASA Ames Research Center
- Phil Nicholson, Cornell University
- Wayne Richie, NASA Langley Research Center, retired
- Kunio Sayanagi, California Institute of Technology
Primitive Bodies Panel

- Joseph Veverka, Cornell University. **Chair**
- Harry Y. McSween, University of Tennessee, **Vice Chair**
- Marc Rayman, Jet Propulsion Laboratory
- Edward Reynolds, Applied Physics Laboratory
- Jessica Sunshine, University of Maryland
- Eric Asphaug, University of California, Santa Cruz
- Timothy McCoy, Smithsonian National Museum of Natural History
- Mark Sephton, Imperial College
- Faith Vilas, Multiple Mirror Telescope Observatory
- Donald Brownlee, University of Washington
- Marc Buie, South West Research Institute, Boulder
- Michael Brown, California Institute of Technology
Mars Panel

- Phil Christensen, Arizona State University, Chair
- Wendy Calvin, University of Nevada, Reno, Vice Chair
- Bobby Braun, Georgia Institute of Technology
- Glen Cunningham, Jet Propulsion Laboratory
- Raymond Arvidson, Washington University, St. Louis
- John Grotzinger, California Institute of Technology
- Linda Elkins-Tanton, Massachusetts Institute of Technology
- Penny King, University of New Mexico
- Francois Forget, Institute Pierre Simon Laplace
- Paul Mahaffy, NASA Goddard Space Flight Center
- David Des Marais, NASA Ames Research Center
- Lisa Pratt, University of Indiana
Satellites Panel

- John Spencer, South West Research Institute, Boulder, **Chair**
- David Stevenson, California Institute of Technology, **Vice chair**
- Glen Fountain, Applied Physics Laboratory
- Tom Spilker, Jet Propulsion Laboratory
- Louise Prockter, Applied Physics Laboratory
- Elizabeth Turtle, Applied Physics Laboratory
- Francis Nimmo, University of California, Santa Cruz
- Jerry Schubert, University of California, Los Angeles
- Krishan Khurana, University of California, Los Angeles
- Hunter Waite, South West Research Institute, San Antonio
- Caitlin Griffith, University of Arizona
- Chris McKay, NASA Ames Research Center