Planetary Science Division Update

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April 18, 2011

Presentation to the PSS

Outline

- Current Program FY11 Status
- PU-238 Status
- Progress during the NASA-ESA Bilat
- PSD plan to respond to the Decadal
- Year of Solar System

Schedule Of Events

- Decadal released March 7th at LPSC
- Decadal Town Hall meetings (March 15 – April 17)
  - See: http://solarsystem.nasa.gov/2013decadal
- Discussions with OMB and OSTP (ongoing)
- FY11 budget passed late last week (CR through Oct 1)
  - PSD funding allocation will occur this week
- FY12 budget under discussion in Congress
- Development of FY13 budget has begun
- President's FY13 budget request to Congress Feb. 2012
  - Will reflect Decadal recommendations within budget realities

Our Current FY11 Budget Status

- PSD previous approach:
  - Missions in ATLO top priority
  - Conservative funding of all other activities (especially R&A) to maintain at or below FY10 levels
- FY11 Continuing Resolution has been passed:
  - Due to CR status no PU-238 restart
  - PSD FY11 funding level ~$1440M (under Agency Review)
- Current actions:
  - Review current funding status of missions in ATLO
  - Provide realistic budget targets for upcoming R&A selections
  - Awards to as many previous “selectable” proposals as funding allows

President's FY12 Planetary Science Budget

	FY 2010	Pres Bud	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
Planetary Science	**$1,364.4**	**$1,485.7**	**$1,488.9**	**$1,365.7**	**$1,326.4**	**$1,271.0**	**$1,188.9**
Planetary Science Research	*$161.6*	*$180.4*	*$183.9*	*$196.0*	*$208.6*	*$208.4*	*$210.5*
Planetary Science Research and Analysis	$131.5	$131.0	$134.6	$135.3	$140.0	$142.8	$149.8
Other Missions and Data Analysis	$21.3	$23.9	$23.7	$25.5	$31.7	$28.2	$23.0
Education and Directorate Management	$3.0	$5.1	$5.1	$14.7	$16.3	$16.7	$16.5
Near Earth Object Observations	$5.8	$20.3	$20.4	$20.5	$20.6	$20.7	$21.1
Lunar Quest Program	*$94.5*	*$121.6*	*$114.5*	*$81.2*	*$48.9*	*$28.1*	*$19.5*
Lunar Science	$31.4	$59.7	$50.9	$48.1	$48.9	$28.1	$19.5
Lunar Atmosphere and Dust Environment Explorer	$48.2	$57.9	$63.2	$33.1			
International Lunar Network	$14.9	$4.0	$0.3				
Discovery	*$184.5*	*$202.0*	*$175.6*	*$205.1*	*$245.7*	*$265.5*	*$242.8*
Gravity Recovery and Interior Laboratory (GRAIL)	$124.1	$104.8	$40.5	$4.4			
Other Missions and Data Analysis	$60.4	$97.2	$135.1	$200.6	$245.7	$265.5	$242.8
New Frontiers	*$279.6*	*$223.8*	*$176.9*	*$265.8*	*$245.5*	*$291.1*	*$296.3*
Juno	$257.1	$184.2	$31.2	$17.6	$17.9	$16.7	$29.6
Other Missions and Data Analysis	$22.4	$39.6	$145.7	$248.2	$227.6	$274.4	$266.7
Mars Exploration	*$438.2*	*$532.8*	*$594.4*	*$433.1*	*$408.7*	*$309.0*	*$245.9*
2009 Mars Science Lab	$258.4	$231.6	$136.4	$40.5	$37.0		
MAVEN	$48.1	$161.2	$240.3	$140.6	$34.9	$15.4	$4.7
Other Missions and Data Analysis	$131.7	$140.0	$217.7	$252.0	$336.8	$293.5	$241.1
Outer Planets	*$100.6*	*$103.5*	*$120.8*	*$80.5*	*$82.2*	*$84.1*	*$88.5*
Technology	*$105.5*	*$121.5*	*$122.9*	*$104.1*	*$86.6*	*$84.9*	*$85.4*

Notional

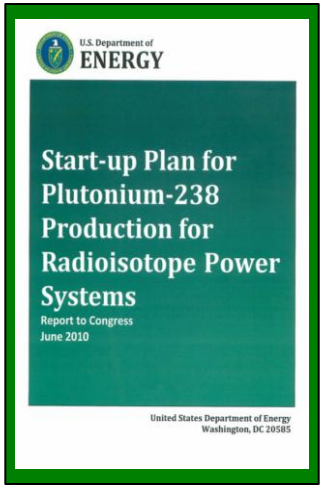
Status of Missions in Formulation

- Discovery-12 AO Status:
  - 28 proposals received, wide diversity of science targets, goals and approaches.
  - Proposers chose to use many of the incentivized, NASA-developed technologies
  - Evaluation in progress and *on schedule* – *April/May*

- New Frontier Step-2 proposals on January 28, 2011
  - MoonRise: SPA Basin Sample Return (Brad Joliff, PI)
  - OSIRIS-Rex: Asteroid sample return (Mike Drake, PI)
  - SAGE: Venus lander (Larry Esposito, PI)
  - Evaluation in progress and *on schedule* – *May/June*

Pu-238 Domestic Production Status

- Currently, NASA relies on existing domestic and Russian Pu-238 inventories, which is insufficient to sustain long-term deep space exploration (Disco, NF, large)
- US Pu-238 Start-up Plan completed by DOE with NASA coordination, and delivered to Congress in June 2010
  - Plan states NASA and DOE equally share the cost
  - Total Estimated Cost (NASA and DOE) is $75M-$90M over 6 years



- NASA Authorization Act of 2010 authorized NASA to fund DOE efforts in Pu-238 Production under a reimbursable agreement
- With the passage of the NASA full-year CR, NASA will not have authority to send DOE money for Pu-238 restart efforts until the FY12 Appropriation

Current NASA Action on Pu-238 Restart

- National Aeronautics and Space Administration Authorization Act of 2010, section 806 levies the following action on NASA:
  - (b) IN GENERAL.—The Administrator shall, in coordination with the Secretary of Energy, *pursue a joint approach beginning in fiscal year 2011 towards restarting and sustaining the domestic production* of radioisotope thermoelectric generator material for deep space and other science and exploration missions.
  - (c) REPORT.—Within 120 days after the date of enactment of this Act, the Administrator and the Secretary of Energy shall *submit a joint report to the appropriate committees of Congress on coordinated agreements, planned implementation, and anticipated schedule, production quantities, and mission applications under this section.*
- A joint NASA-DOE response is drafted and was delivered to OMB in February, 2011. It is currently under review before being delivered to Congress.

NASA-ESA Bi-Lateral Meeting (1/2)

- 2016 ExoMars/TGO progressing well:
  - Passed KDP-A March 29, 2011
  - Outstanding issues:
    - Acceleration of NASA instrument schedules & relax some AIV requirements
    - Elevation to Category-1/APMC due to international *program-level* commitment
- 2018 Dual Rover Mission:
  - ESA cost proposal and NASA's FY12 President's Budget required a new approach
  - Concurrently the mission's technical complexity created unacceptable cost and technical risk
- Agencies agreed to descope to a single-rover architecture:
  - Merge rover design - leverage both partner's goals, capabilities & assets
    - NASA focused on Decadal Science/sample caching
    - Use MSL *build-to-print* decent stage for landing
    - ESA focused on mobility and drilling
  - Joint Executive Board provided guidelines and defined roles and responsibilities
  - Joint Engineering WG began April 6th to create best technical solution
  - Forming joint science team to set joint science objectives and Level-1 requirements

NASA-ESA Bi-Lateral Meeting (2/2)

- Key decision gate for ESA is May 26-27 PB-HME
  - Go/No-Go decision for 2018 basic architecture concept(s) and ESA/NASA responsibilities
- Joint Mars Sample Return Working Group continues activities will ramp up as 2018 Joint Rover Mission take shape

Cosmic Visions:

- ESA directs its 3 CV-L class missions to reformulate studies
  - NASA invited to have observer during their deliberations/study
- NASA directs JPL to work descoped Europa mission study
  - ESA invited to have observer during our deliberations/study
- Reaffirm NASA's commitment to support ESA's *Laplace* mission if it is chosen as the CV-Large class mission as a Mission of Opportunity

Budget Schedule & Activities

- FY11: Analysis & Planning
  - No changes proposed
  - Select three Discovery 12 Phase A missions and New Frontiers-3
  - Replan the 2018 Mars mission with ESA

- FY12: Transition
  - Ramp down Europa study; initiate MOO with ESA on their Laplace mission if selected by ESA (TBD)
  - Finalize MOU with ESA for Joint Mars Program

- FY13/14: Implementation of Decadal priorities

Planetary Program Architecture
Recommended by the Planetary Decadal Survey

Large Missions ("Flagship"-scale)

"Recommended Program"
(budget increase for JEO new start)

1) **Mars Astrobiology Explorer-Cacher – descoped**
2) **Jupiter Europa Orbiter (JEO) – descoped**
3) **Uranus Orbiter & Probe (UOP)**
4/5) **Enceladus Orbiter & Venus Climate Mission**

"Cost Constrained Program"
(based on FY11 Request)

1) **Mars Astrobiology Explorer-Cacher – descoped**
2) **Uranus Orbiter & Probe (UOP)**

"Less favorable" budget picture than assumed
(e.g., outyears in FY12 request)

Descope or delay Flagship mission

Discovery

$500M (FY15) cap per mission (exclusive of launch vehicle) and 24 month cadence for selection

New Frontiers

$1B (FY15) cap per mission (exclusive of launch vehicle) with two selections during 2013-22

Research & Analysis (5% above final FY11 amount then ~1.5%/yr)

Technology Development (6-8%)

Current Commitments (ie: Operating Missions)

PSD Decadal Budget Planning

- Lay In Current Commitments
  - All Operating Missions Through Expected End of Life
  - Current R&A Awards
  - All missions in development or competition
    - Juno, GRAIL, MSL, LADEE, MAVEN, EMTGO
    - New Frontiers-3, and Discovery 12
  - In-Space Propulsion Technology
  - Radioisotope Power System Program
  - Pu-238 Production
- Accommodate Decadal Recommendations
  - Maintain a healthy R&A program
  - Discovery AO's on 2 year Cadence
  - New Frontiers AO's on 5 year Cadence
  - Mars 2018 Cache Rover Directly Tied to MSR
    - Includes initiation of MSR high-priority technologies wedge
- Per OMB $10M/year set aside for cooperative activities with Human Exploration

- Full decadal recommendations greatly exceed President's FY12 Budget
  - Must use decision rules from decadal to develop a balanced budget

Decadal Decision Rules

- Page 9-6: NASA's suite of planetary missions … should consist of a *balanced mix of Discovery, New Frontiers, and Flagship* missions, enabling both a steady stream of new discoveries and challenges …

- Page 9-21: It is also possible that the budget picture could turn out to be less favorable … If cuts to the program are necessary, the committee recommends that the first approach should be *descoping or delaying Flagship missions*. *Changes to the New Frontiers or Discovery programs should be considered only if adjustments to Flagship missions cannot solve the problem*.

- Actions based on Decadal Guidance:
  - Maintain a balanced program – small, medium, large missions
  - Maintain a partnership with ESA
  - Descope flagship missions as a first resort due to tight budgets
  - If flagship descopes are *not sufficient* then stretch out New Frontiers and Discovery A/Os

Approach to Develop new "Notional" Budget

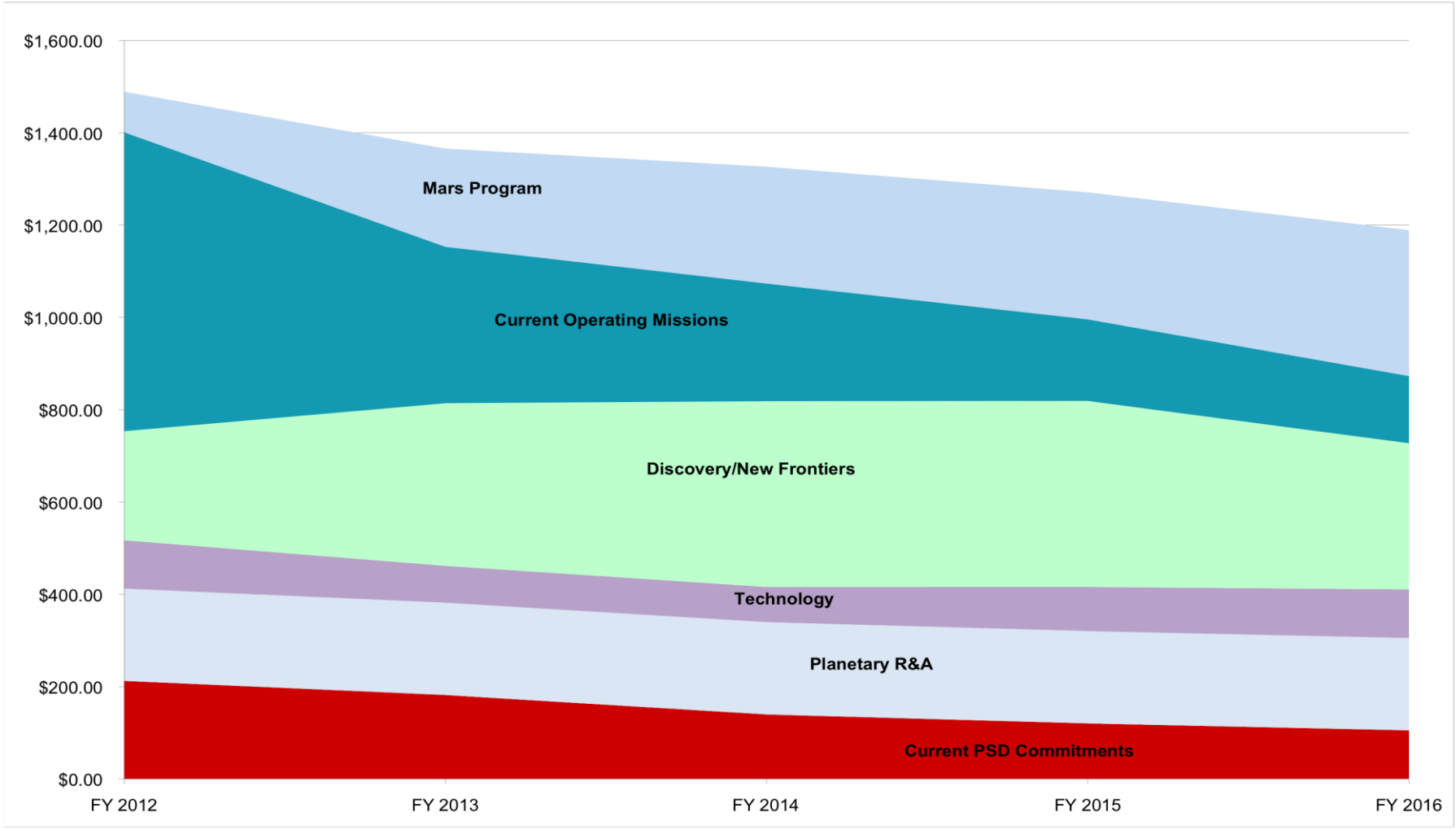
- Capped R&A at $200M/year
- Next Discovery AO on current >36 month cadence
  - All subsequent AO's accelerated to 24 Month Cycle
- Select NF-3 planned for NF-4 and NF-5 within decade
  - Will maintain New Frontiers schedule
- Extended Mission budget for ALL operating missions
  - Senior Review used for determining which missions to be extended
- Dedicated Lunar R&A wedge transferred to PSD R&A
- Residual Lunar Quest Program moved to Discovery
- JEO Descoped to Studies Funded FY11/12
  - No JEO Instrument AO
  - Budget for some radiation technology efforts

Overall Program Content

- Mars Exploration Program (Negotiated with ESA)
  - EMTGO, MOMA, Mars 2018 (JR-1), Management, Future missions
- Discovery Program
  - Strofio, LaRa, Disc-12, Management, Future missions
- New Frontiers Program
  - NF-3, Management, Future missions
- Technology Program
  - PIDDP, ASTID, ISP, RPS, MSR Tech, OP Tech
- Planetary R&A
  - Move PIDDP and ASTID to Technology Program
- Mission Commitments (operating etc.)
  - GRAIL, Juno, MSL, MAVEN, LADEE, MER, MRO, Odyssey, Mars Express, Dawn, New Horizons, LRO, MESSENGER, Deep Impact, Stardust, ASPERA-3, Rosetta, Cassini
- Other Commitments
  - Pu-238, AMMOS, OPF studies, JGO/ESA MOO, Joint coordination w/HSF

Operating
Development
In Competition

A PSD "Notional" Decadal Budget



Year of the Solar System
Planetary Science Mission Events

* Completed

2010

* September 16 – Lunar Reconnaissance Orbiter in PSD
* November 4 - EPOXI encounters Comet Hartley 2
* November 19 - Launch of O/OREOS

2011

* February 14 - Stardust NExT encounters comet Tempel 1
* March 7 – Planetary Science Decadal Survey released
* March 17 - MESSENGER orbit insertion at Mercury (8:45 pm Eastern)

July - Dawn orbit insertion at asteroid Vesta

August 5 - Juno launch to Jupiter

September 8 - GRAIL launch to the Moon

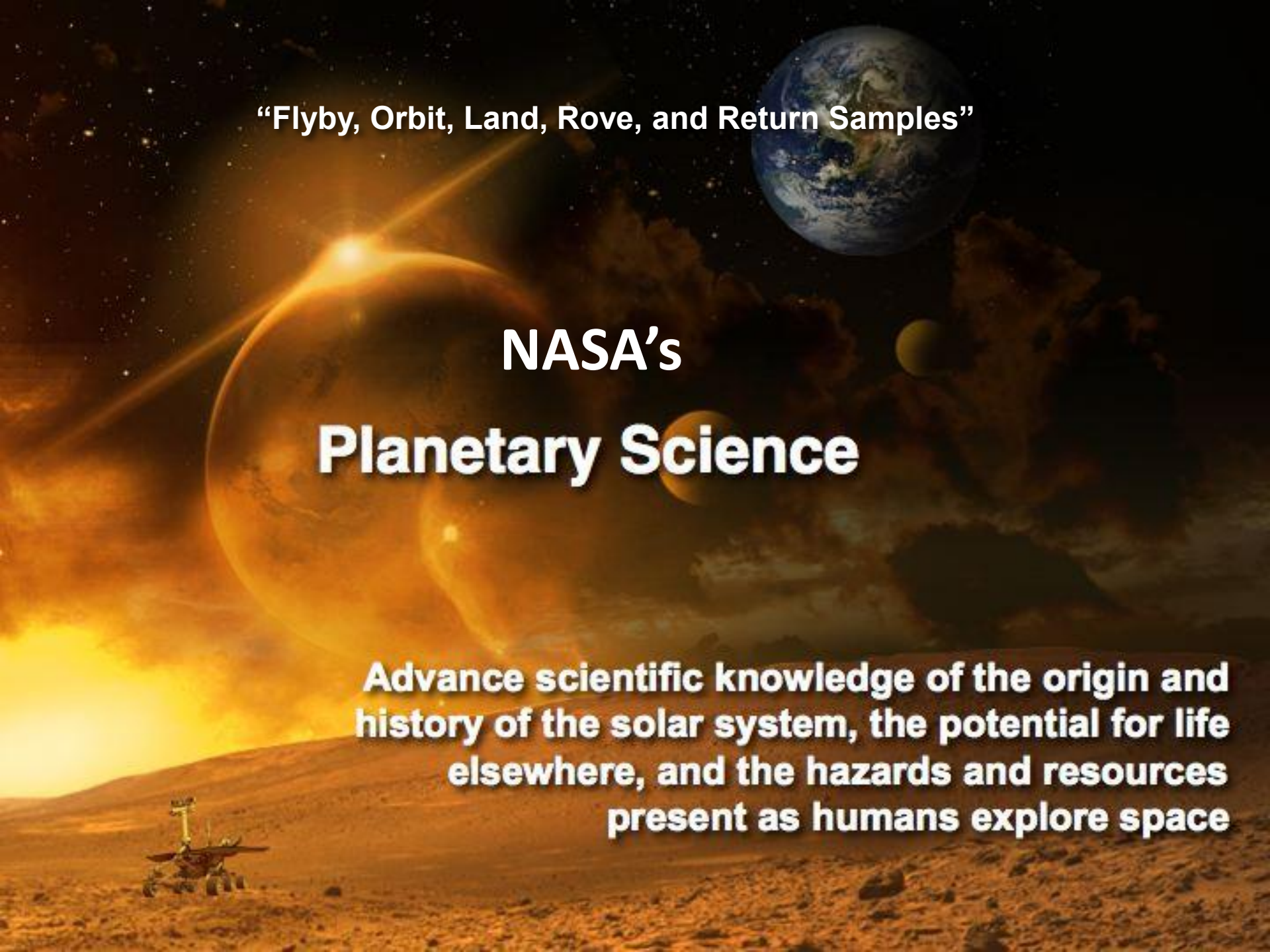
November 25 - MSL launch to Mars

2012

Mid 2012 -- Mars Opportunity Rover gets to Endeavour Crater

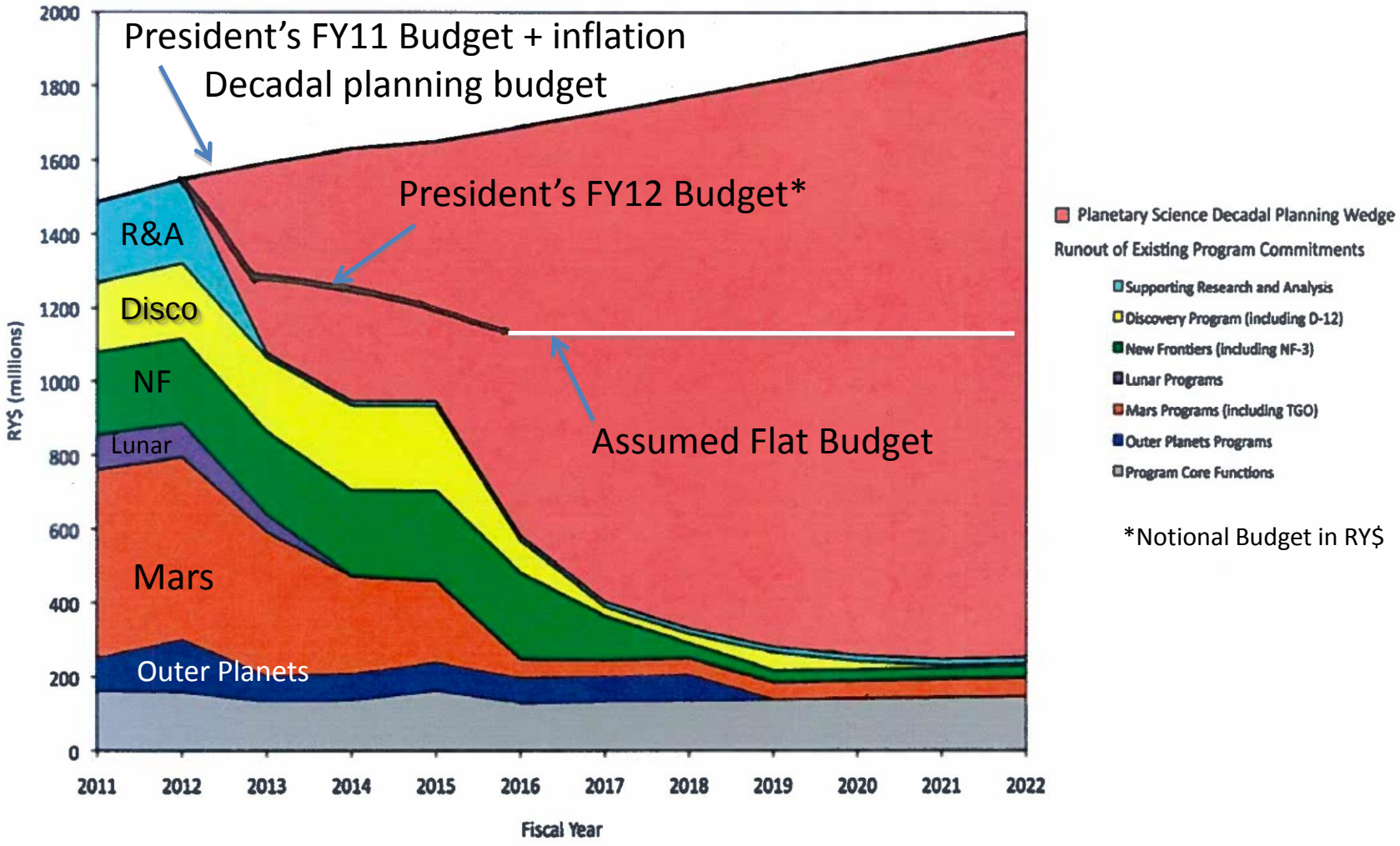
Mid-year -- Dawn leaves Vesta starts on its journey to Ceres

August - MSL lands on Mars


"Flyby, Orbit, Land, Rove, and Return Samples"
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

Planetary Funding Profiles

FY11 and FY12 Requests



*Notional Budget in RY$