Planetary Science Division Update

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Director, Planetary Science
March 19, 2012

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
- May 5 - Selection of 3 Discovery-class missions for study
- May - Selection of the next New Frontier mission for flight, OSIRIS-Rex
- July 16 - Dawn orbit insertion at asteroid Vesta
- August 5 - Juno launched to Jupiter
- August 9 - Mars Opportunity Rover gets to Endeavour Crater
- September 10 - GRAIL launch to the Moon
- November 26 - Mars Science Laboratory launch to Mars
- December 31 - GRAIL-A (Ebb) orbit insertion at Moon

2012

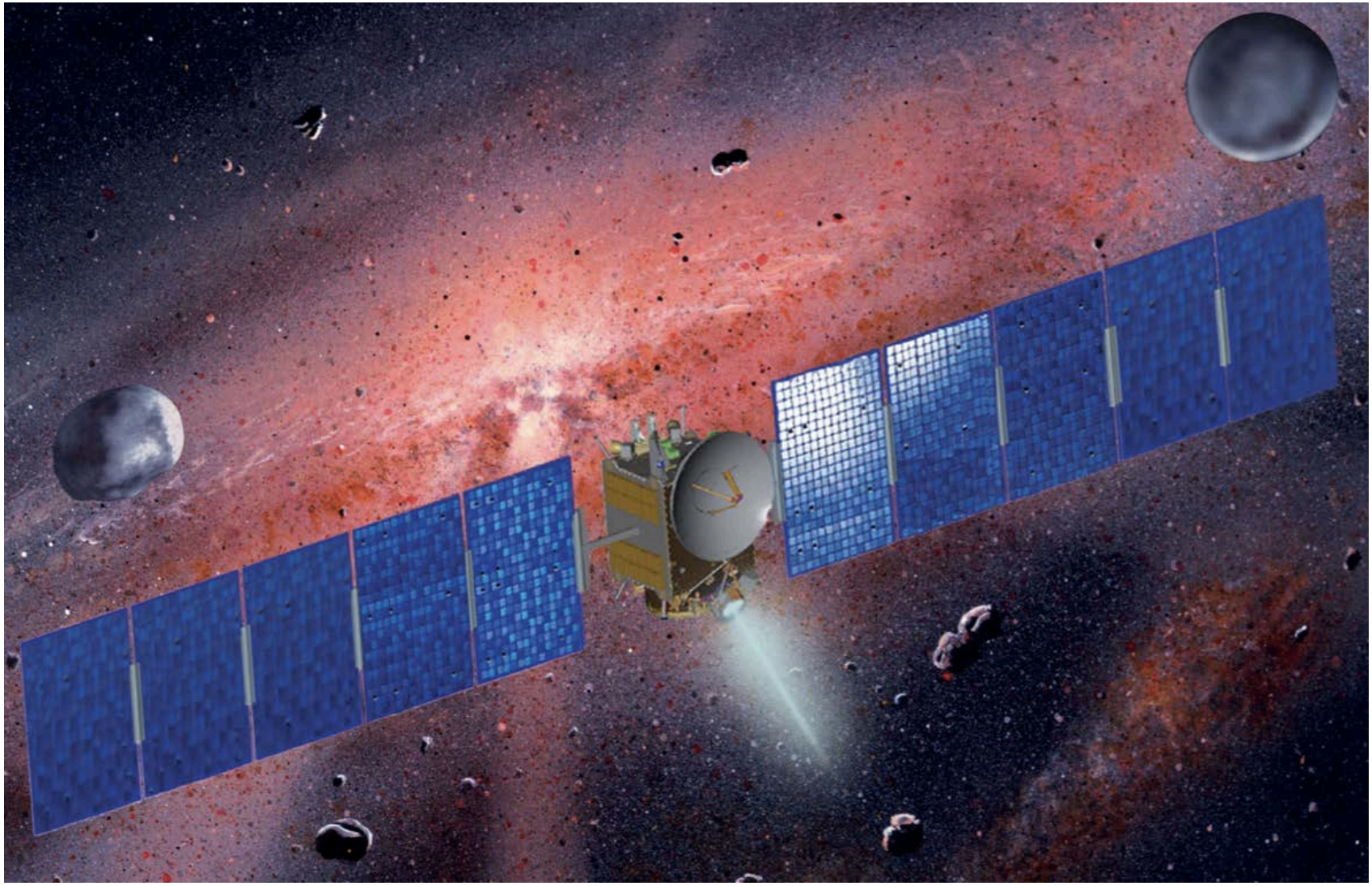
- January 1 - GRAIL-B (Flow) orbit insertion at Moon

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

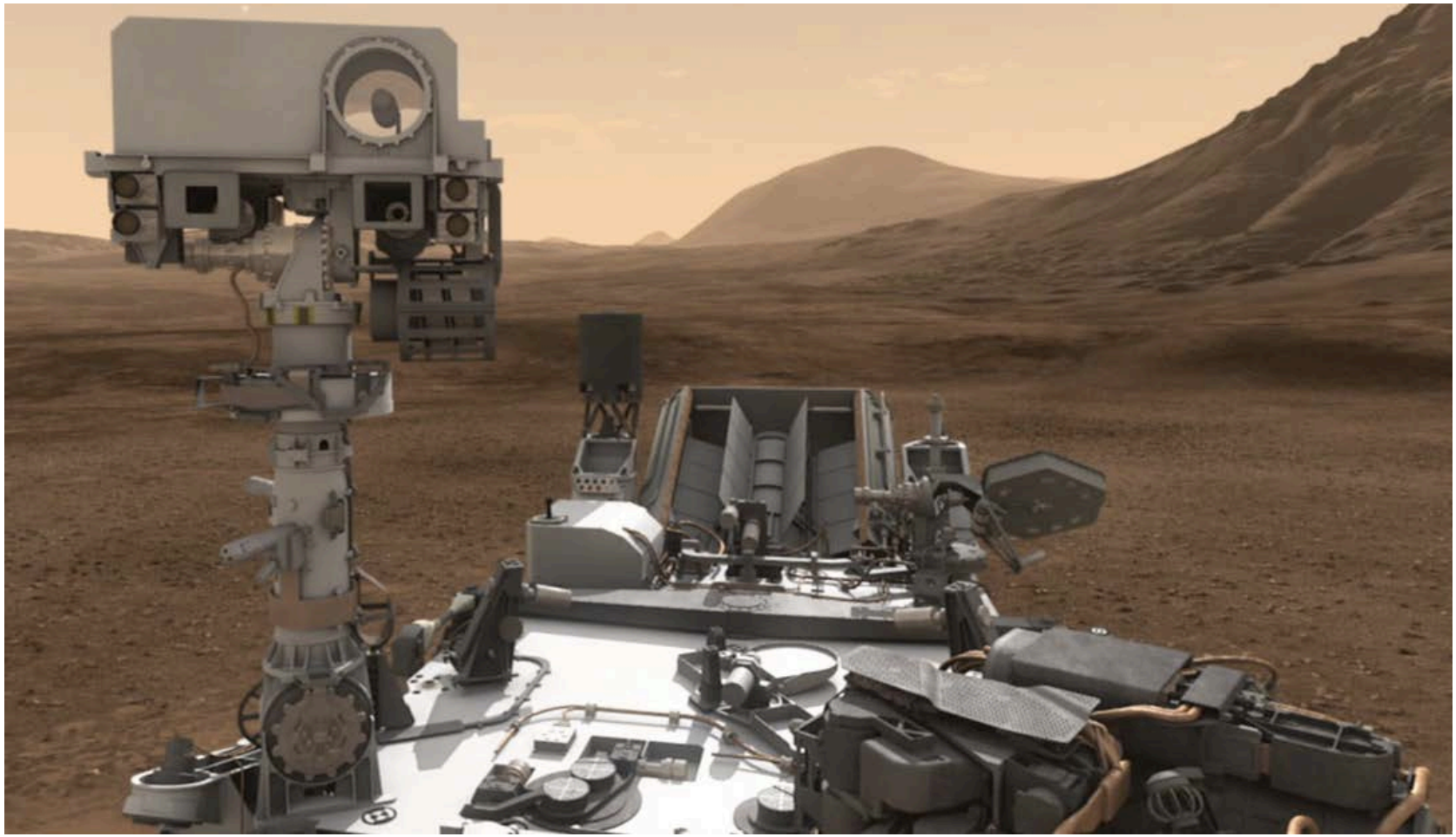
August - MSL lands on Mars

http://solarsystem.nasa.gov

Dawn From Vesta To Ceres



Top Priority for PSD in FY12



- Safely land MSL on Mars! Aug 5 (~10 PM Pacific)

Upcoming Launches

- MAVEN and LADEE in final phases of development for a 2013 launch readiness date

New Frontiers Program

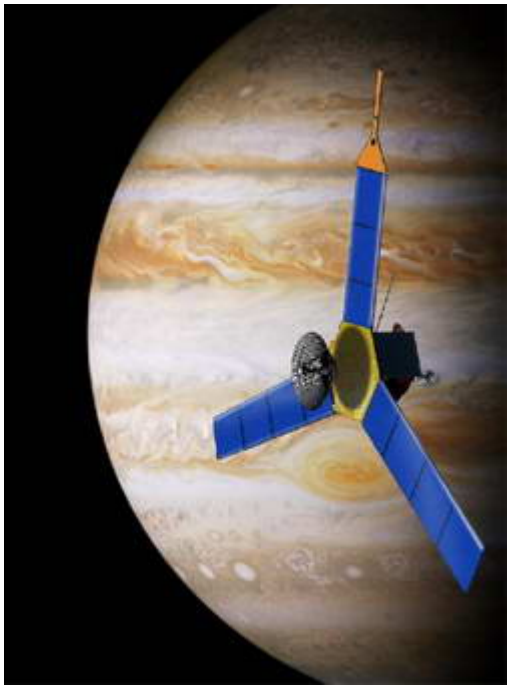
1st NF mission
New Horizons:

Pluto-Kuiper Belt

Launched January 2006
Arrives July 2015
PI: Alan Stern (SwRI-CO)

2nd NF mission
JUNO:

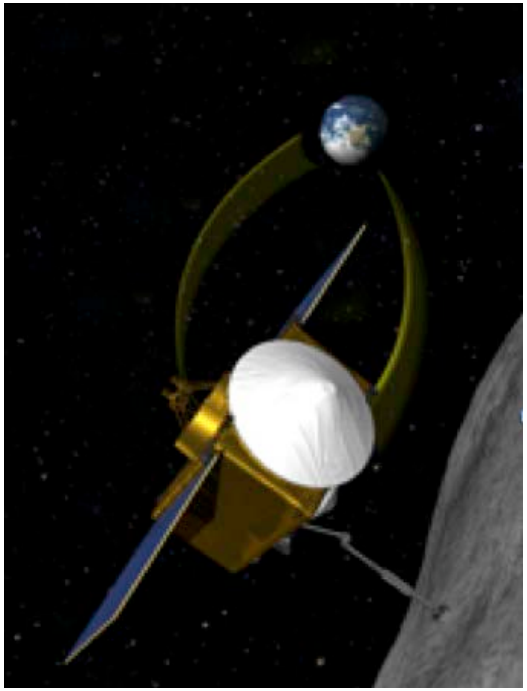
Jupiter Polar Orbiter



Launched August 2011
Arrives July 2016
PI: Scott Bolton (SwRI-TX)

3rd NF mission
OSIRIS-REx

Asteroid Sample Return



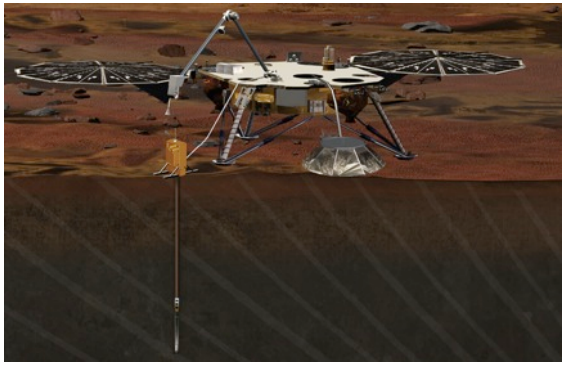
Sept. 2016 Launch
PI: Dante Lauretta (UA)

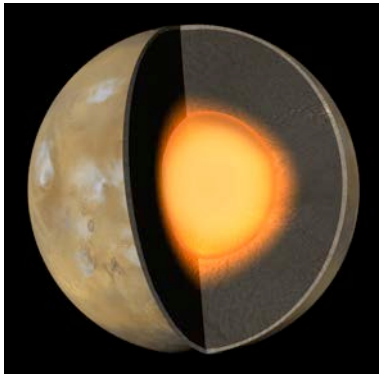
Selected

Next Discovery Mission – Candidate Studies

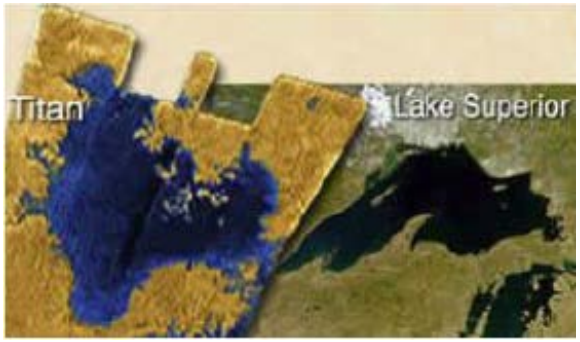
CHopper: Comet Hopper
PI: Jessica M. Sunshine, UMD

InSight
PI: Bruce Banerdt, JPL





TiME: Titan Mare Explorer
PI: Ellen Stofan, Proxemy Research



- Step-2 Proposals due March 19
- Selection announcement on track for mid-July

Update on Senior Review

- Multi-Mission Senior Review schedule for FY13-14:
  - Call for Proposals (Jan 31, 2012)
  - Proposals due to PSD (May 30, 2012)
  - Final reviewer report to PSD Director (Spring 2012)
  - Senior Review results executed beginning of FY13

- Extended missions out of cycle that have been approved: MESSENGER and GRAIL

Other FY12 Planned Accomplishments

- Initiate a replan for the future exploration of Mars with Human Exploration and Office of Chief Technologist that supports a more integrated approach that advances scientific and human exploration objectives
- Completed Europa Mission studies delivered to Congress (April/May)
- Issue a new charter for a Science and Exploration Institute as expanding NLSI (Lunar ->Flexible path) and issue a new call for nodes
- Acceleration of the identification and characterization of Near-Earth Objects

PU-238 & RPS Status

- DoE passed FY12 Omnibus Appropriations:
  - “The conferees provide no funds for the Plutonium-238 Production Restart Project”
- NASA/PSD has provided funding in FY12 to complete the necessary study and assessments
  - Expect the assessment to be completed this FY
  - Develop a new funding strategy to enable restart but with a larger share of the funding from NASA
- ASRG - will complete Engineering & Qual units and continue with life testing

Supporting Research & Technology (SR&T)

Planetary Science Research

- Research & Analysis Program (PGG, Cosmochem, PAST, PATM, PME, PIDDP, Origins, PP, LPI, ASTEP, ASTID, NAI, Exo)
- Near Earth Objects Observation (NEOO)
- Planetary Data Systems (PDS)
- Astromaterial Curation

Mars Research & Analysis

- Mars Data Analysis Program (MDAP)
- Mars Fundamental Research Program (MFRP)
- Phoenix/MRO PSP

Discovery Research

- SRLI DAP/LARS (Lab Analysis of Returned Samples)
- PMDAP (Planetary Missions DAP)
- MESSENGER/Dawn PSP
- GRAIL PSP

Outer Planets Research

- OPRP, Cassini DAP/PSP

Lunar Science Research

- NLSI, LASER, MMAMA, PGG/Cosmo Lunar, LRO PSP

NASA PLANETARY RESEARCH AND DATA ANALYSIS PROGRAMS

PROGRAM	FY10	FY 11	FY 12
AstroCuration	4.473	5.509	$6,000,000
Near-Earth Objects	5.800	7.848	$20,425,000
Hayabusa Participating Scientist Program	0.259	0.304	$0
Planetary Data System	10.120	11.504	$14,000,000
New Horizons at Jupiter Data Analysis Program	1.234	1.188	$0
Cassini Data Analysis (CDAP)	4.035	5.527	$5,610,108
Outer Planets Research (OPR)	7.922	11.998	$11,880,000
Mars Multi-Mission DA & Data Products	1.126	0.274	$53,799
Mars Fundamental Research Program	7.091	7.601	$8,767,205
Mars Data Analysis Program (MDAP)	7.737	8.375	$9,073,314
Mars Phoenix DAP	0.000	1.093	$804,440
MER Participating Scientist Program	4.172	0	$0
Mars Instrument Development Prog (MIDP)	2.677	1.051	$0
Sample Ret Lab Inst & Data Anlys (SRLIDAP)	3.947	10.693	$9,513,274
Discovery Data Analysis (DDAP now PMDAP)	2.094	2.516	$3,500,000
Messenger Participating Scientist Program	1.146	2.240	$2,376,000
DAWN Participating Scientist Program	0.555	1.670	$1,710,000
Planetary Geology & Geophysics (PGG)	10.044	12.116	$11,889,338
Cosmochemistry (COSMO)	11.670	12.331	$14,506,534
Planetary Astronomy (PAST)	9.963	9.045	$10,163,263
Planetary Atmospheres (PATM)	8.753	8.915	$9,100,000
Planetary Instrument Def & Dev (PIDDP)	10.086	8.503	$10,945,652
Origins of the Solar System (ORIGINS)	5.267	5.272	$7,118,394
Neo-Wise/NEO	1.800	0.660	$276,000
Planetary Protection	3.190	2.512	$2,539,957
Astrobio Sci & Tech for Expl Planets (ASTEP)	6.157	9.530	$13,321,848
Astrobiology Inst Development (ASTID)	6.805	7.684	$8,128,147
National Astrobiology Institute (NAI)	19.875	20.790	$27,292,168
Exobiology/Evolutionary Biology (EXO)	14.744	16.52	$15,000,000
Planetary R&A (misc)	13.201	3.307	$4,530,000
Venus Express	1.080	1.056	$1,080,000
Planetary Science US Particpating Investigator Program	0.752	0.712	$304,971
NLSI	11.535	13.859	$9,319,255
Lunar Reconaissance Orbiter Participating Scientist (LRO PSP)	1.290	0.866	
Lunar Advanced Science & Exploration Research (LASER)	4.325	6.878	$8,419,488
Moon and Mars Analog Mission Activities	0.714	0.580	$710,963
GRAIL Guest Scientist Program			$750,000
Total R&A Budget	**205.639**	**220.527**	**$249,109,118**
Overall Planetary Budget	**1,364.400**	**1,446.180**	**$1,500,000,000**
R&A as % of Budget	15.1%	15.2%	16.6%

FY03: $152M

FY04: $177M

FY05: $185M

FY06: $163M

FY07: $149M

FY08: $180M

FY09: $207M

FY10: $206M

FY11: $221M

FY12: $249M

(Planned)

Planetary’s Future Budget

President's FY13 Budget

	FY 11	FY 12	FY 13	FY 14	FY 15	FY 16	FY 17
Planetary Science	$1,450.8	$1,501.4	$1,192.3	$1,133.7	$1,102.0	$1,119.4	$1,198.8
Planetary Science Research	$158.8	$174.1	$188.5	$222.5	$233.4	$231.7	$230.3
Lunar Quest Program	$130.2	$139.9	$61.5	$6.2			
Discovery	$192.0	$172.6	$189.6	$242.2	$235.6	$193.8	$134.3
New Frontiers	$213.2	$160.7	$175.0	$269.8	$279.6	$259.9	$155.1
Mars Exploration	$547.4	$587.0	$360.8	$227.7	$188.7	$266.9	$503.1
Outer Planets	$91.9	$122.1	$84.0	$80.8	$78.8	$76.2	$76.3
Technology	$117.3	$144.9	$132.9	$84.6	$85.9	$90.9	$99.6

- Grey region is a "notional" budget – top line remains the same but

Planetary Science Budget Features

<u>What Changed:</u>

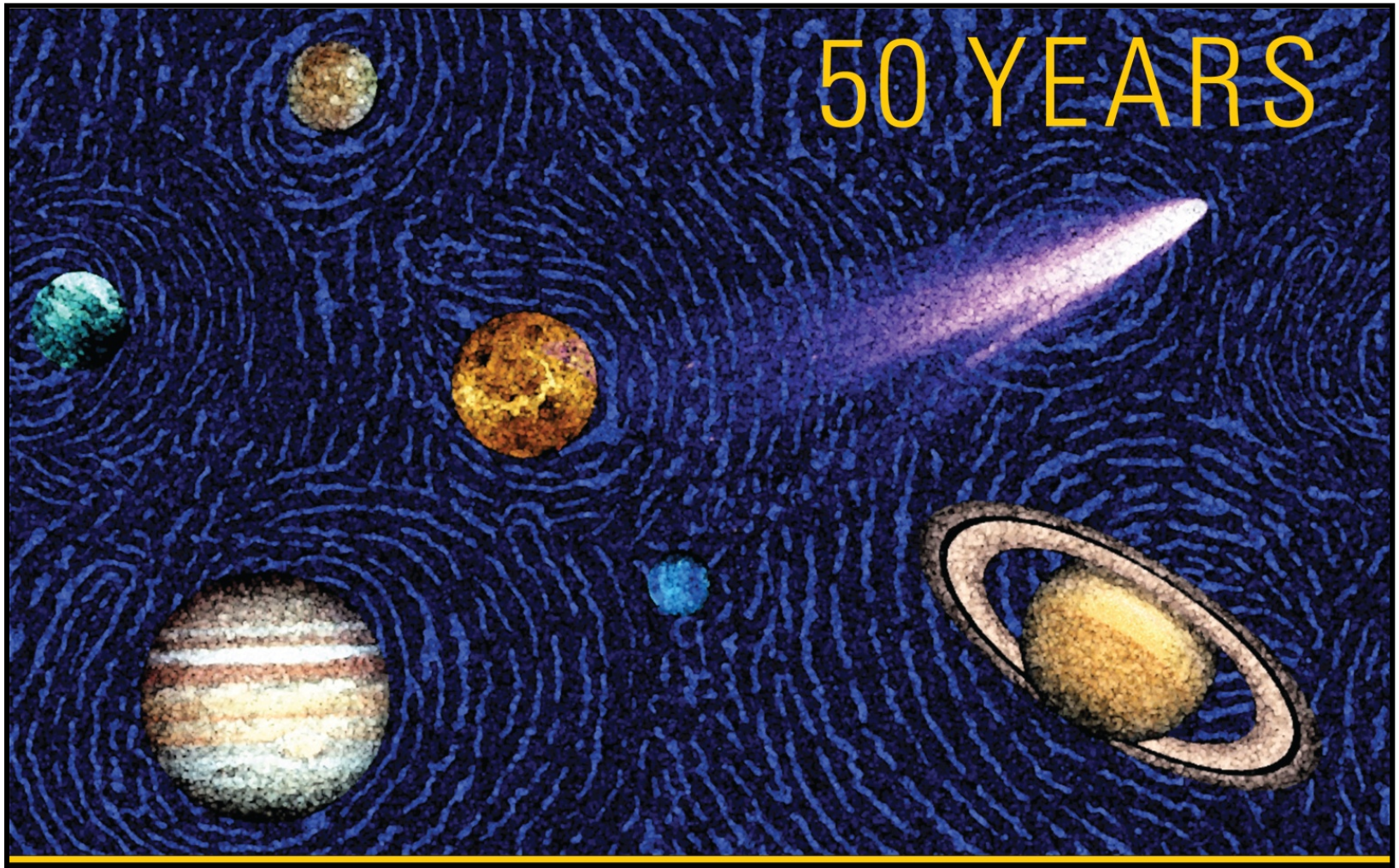
- Initiate a new Mars exploration strategy as an integrated approach by partnering with Human Exploration and the Office of the Chief Technologist:
  - Ending work on 2016 ExoMars Trace Gas Orbiter and Mars 2018 ExoMars rover
  - Looking at a robotic exploration mission
- Reduced Discovery flight rate with Discovery 13 AO release moved to FY15
- New Frontiers – 4 AO release moved to FY16
- Lunar Quest Program phased out after LADEE with remaining activities absorbed into Planetary Research Programs (NLSI & LASER) and Discovery (LRO)
- Establishes a Joint Robotic Precursor Activity with HEOMD

Planetary Science Budget Strategy

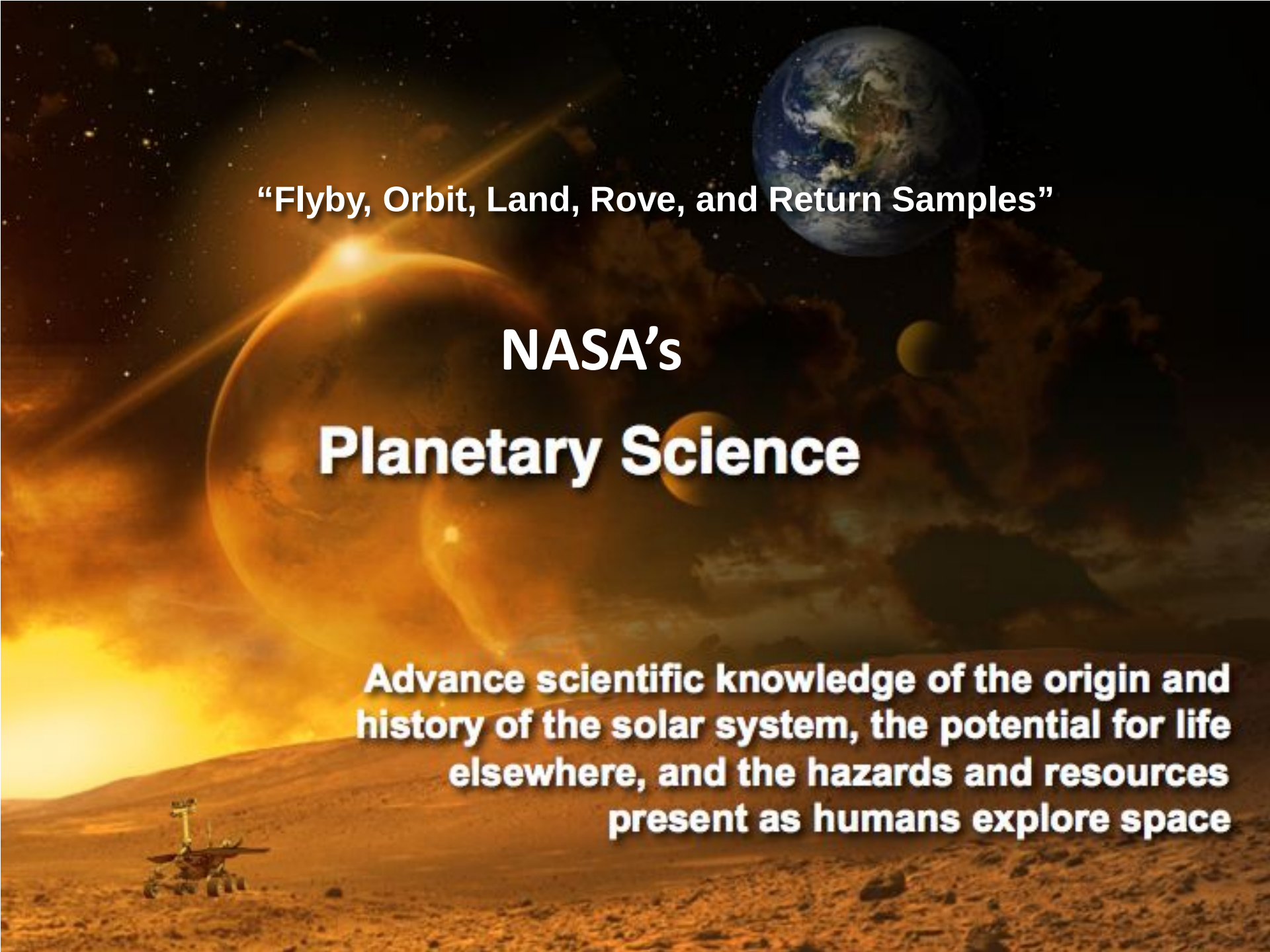
- Fully funds developing missions: LADEE, MAVEN
- Fully funds OSIRIS-REx mission for LRD in 2016
- Fully funds Discovery-12 mission for LRD in 2016
- Fully funds the Advanced Stirling Radioisotope Generator (ASRG) for potential Discovery-12 selection
- Fully funds missions in prime operations
- Optimize extended mission funding through a Senior Review process every 2 years
- Deliver on our international commitments (Mars Express, Rosetta, and BepiColombo)
- Maintains healthy Supporting Research & Technology
- Mars Program Re-plan initiated with Human Exploration and the Office of Chief Technologist

Future of Planetary Science

- Planetary Decadal lays out the next decade science strategy
  - We are in the middle of a major revolution in the understanding of the origin and evolution of the solar system and if there is life beyond Earth
- Human exploration is depending on planetary science to lead the way in understanding the environment and hazards humans will face beyond low Earth orbit. – Moon, Asteroids, Mars
  - President Obama has stated that we will visit an asteroid by 2025 circle Mars in 2030 and that Mars was the ultimate destination
  - This makes planetary science a critical component to his National Space Policy
- The National Space Policy also stresses international cooperation on mutually beneficial space activities
- Utility: finding potentially hazardous objects that threaten the Earth
- We are constantly rewriting the textbooks.
  - If any one has the “inspiration factor” it’s got to be Planetary Science!



solar system exploration


"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