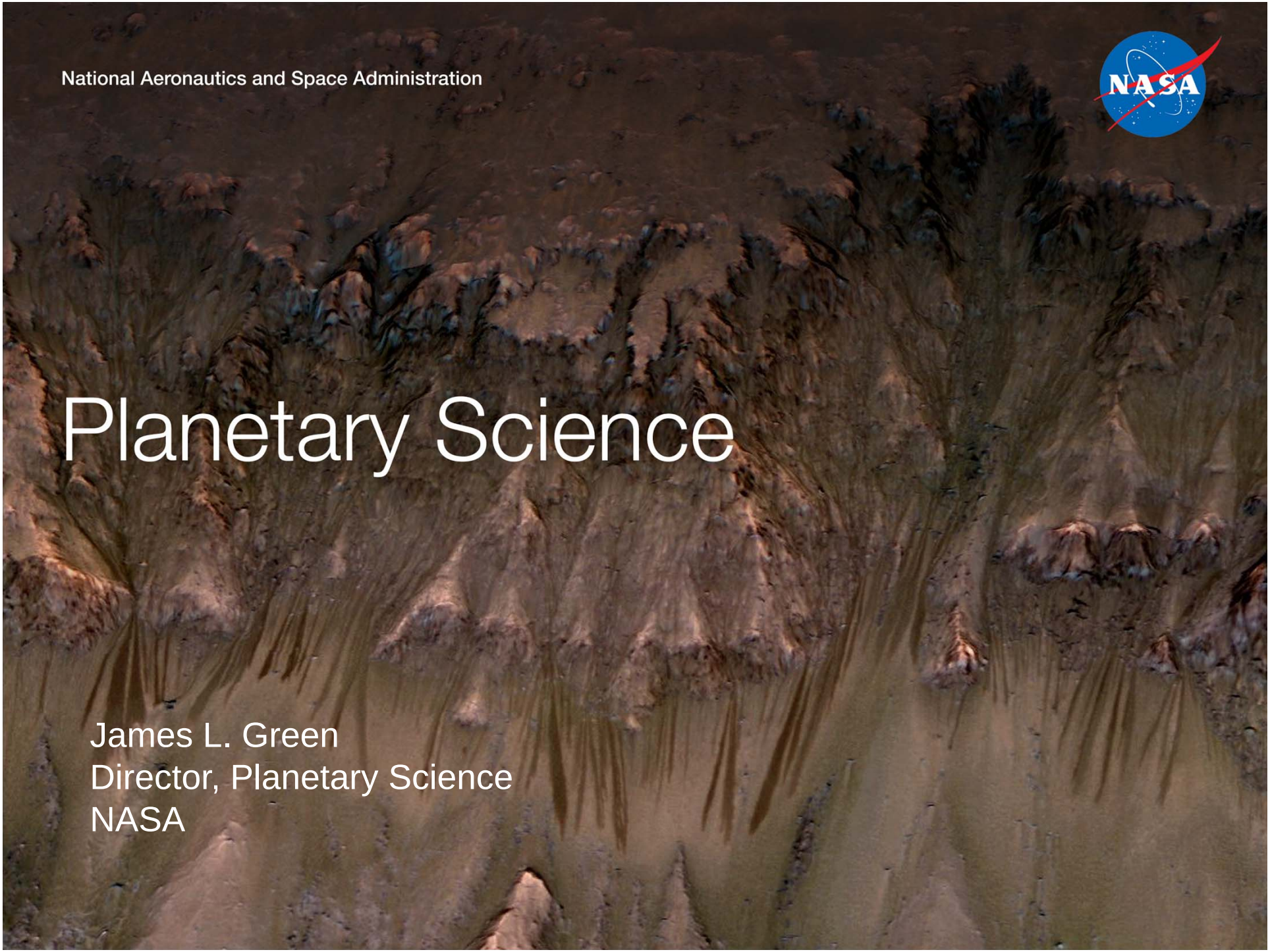
National Aeronautics and Space Administration
NASA
Planetary Science
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Year of the Solar System
Planetary Science Mission Events

* Completed

2010

* September 16 – Lunar Reconnaissance Orbiter in PSD
* November 4 - EPOXI encounters Comet Hartley 2
* November 19 - Launch of O/OREOS
* December 7- Venus Climate Orbiter (JAXA)

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 launch to Jupiter
* August 9 - Mars Opportunity Rover arrives at Endeavour Crater
* September 10 - GRAIL (A and B) launch to the Earth's Moon
* November 26 – Mars Science Laboratory (MSL) launch to Mars
* December 31 – GRAIL A (Ebb) orbit insertion at Earth's Moon

2012

* January 1 – GRAIL B (Flow) orbit insertion at Earth's Moon

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

August 5 - MSL lands on Mars

Planetary Science Division Overview

- Overarching goal: ***Ascertain the content, origin, and evolution of the solar system and the potential for life elsewhere***

- Major Activities (near term):
  - Develop a new Mars exploration strategy by partnering with Human Exploration, Office of Chief Technologist, and interested international partners
  - Safely land the Mars Science Lab – Curiosity rover on the surface of Mars
  - Launch LADEE and MAVEN in 2013
  - Dawn spacecraft to break out of orbit around Vesta and will be targeted towards Ceres, the largest object in the asteroid belt
  - Support 14 operating missions: (MESSENGER, GRAIL, LRO, Deep Impact, MRO, Odyssey, Opportunity, Dawn, Juno, Cassini, and New Horizons) and 3 ESA partnered missions (Venus Express, Mars Express, and Rosetta)
  - Provide open access to an ever increasing array of planetary data and extra-terrestrial samples for analysis

Major Recent Accomplishments - Flight

- Dawn achieved orbit around Vesta in July ’11
- Successful Launches:
  - Juno - August ‘11 and is in Cruise Phase to Jupiter
  - GRAIL - September ‘11 and inserted in Lunar Orbit
  - MSL/Curiosity - November ’11 and is in Cruise Phase to Mars

  MESSENGER achieved orbit around Mercury in March ‘11
- Comet encounters of Hartley 2 in November ’10 (EPOXI/Deep Impact) and Tempel 1 in February ’11(Stardust/NeXT)
- Opportunity reached Endeavor Crater
  - Opportunity 8th anniversary in January ’12
- Successfully completed CDR for both LADEE and MAVEN
  - Both are in implementation phase with LRDs in 2013
- Selected three Discovery missions for study:
  - Comet lander/hopper, Mars lander, Titan boat
- Selected New Frontiers-3 mission for flight:
  - OSIRIS-REx (asteroid sample return)
- Operating missions continue to make new discoveries

Planetary Science Budget Features

- **What Changed:**

  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
- Lunar Quest Program phased out after LADEE with remaining activities absorbed into Research Programs and Discovery
- NEO program expanded to improve and increase its detection efforts

- **What's the Same:**
- Continuing 14 operating science missions:
  - MESSENGER, GRAIL, LRO, Deep Impact, MRO, Odyssey, Opportunity, Dawn, Juno, Cassini, New Horizons
  - ESA partnered missions: Venus Express, Mars Express, Rosetta
- LADEE and MAVEN launches in 2013
- Technology and Data Programs: Develop Radioisotope Power Systems (RPS); Planetary instruments; continue to support Planetary missions with navigation and sample curation
- Continue with Research & Analysis awards selections and awards

SMD Tentative Future Mission Opportunities (Based on Notional Outyear Budgets)

Future Astrophysics and Heliophysics Explorer Mission Selections:

Spring 2013	Step 2 Explorer selection and MoO (current AO)
TBD	Next AO released – Timing dependent on whether solicitation is for a mission of opportunity (AO in late 2012) or mission (AO in early 2014)

Future Discovery Mission Selections:

Summer	2012	Discovery 12, for launch NLT 2016 (current AO)
	2015	Discovery 13, for launch ~2020

Future New Frontiers Mission Selections:

2016	New Frontiers 4, for launch ~2023

Future Venture Class Mission Selections:

2012	EV-2 orbital, for launch ~2017; every 4 years thereafter (current AO)
2012	EV-I1 instruments, for delivery ~2016; every ~15-18 mos thereafter (current AO)
2014	EV-3 suborbital; every 4 years thereafter

Future Solar Terrestrial Probes Mission Selections:

2015	Step 1 STP#5 selection

Planetary Science Program Content

	FY 11	FY 12	FY 13	FY 14	FY 15	FY 16	FY 17
				(FY14-17 estimates are notional)			
Planetary Science	**1450.8**	**1501.4**	**1192.3**	**1133.7**	**1102.0**	**1119.4**	**1198.8**
Planetary Science Research	158.8	174.1	188.5	222.5	233.4	231.7	230.3
Planetary Science Research and Analysis	122.3	122.3	125.3	130.1	133.5	134.6	135.5
Near Earth Object Observations	7.8	20.4	20.5	20.5	20.5	20.5	20.5
Other Missions and Data Analysis	24.0	27.4	38.8	64.6	72.1	69.5	66.9
Rosetta	6.3	8.0	10.6	16.5	12.8	7.6	0.5
Hayabusa (MUSES-C)	0.8						
Planetary Data System	11.5	13.6	13.3	13.7	13.8	13.8	13.8
Astromaterial Curation	5.5	5.8	4.9	5.0	5.1	5.2	5.3
Joint Robotics Program for Exploration			10.0	10.0	10.0	10.0	10.0
Directed Research and Technology				19.4	30.3	32.8	37.3
Education and Directorate Management	4.6	4.0	4.0	7.3	7.3	7.1	7.4
Robotics Alliance	3.9	3.9	3.9	4.0	4.0	3.8	4.1
Directorate Management	0.7	0.1	0.1	3.3	3.3	3.3	3.3
Lunar Quest Program	130.2	139.9	61.5	6.2			
Lunar Science	61.7	66.7	17.3	3.7			
Lunar Management	2.9	2.6	1.0				
Lunar Reconnaissance Orbiter	26.8	47.7	7.4				
Lunar Science	31.9	16.5	8.9	3.7			
Lunar Atmosphere and Dust Environment Explorer	64.5	70.4	41.4	2.5			
Surface Science Lander Technology	4.0	2.8	2.8				

Planetary Science Program Content (cont'd)

	FY 11	FY 12	FY 13	FY 14	FY 15	FY 16	FY 17
				(FY14-17 estimates are notional)			
Discovery	192.0	172.6	189.6	242.2	235.6	193.8	134.3
Other Missions and Data Analysis	192.0	172.6	189.6	242.2	235.6	193.8	134.3
Discovery Future	4.5	60.7	138.3	197.4	195.5	163.9	96.2
Gravity Recovery and Interior Laboratory	103.4	29.8	8.7				
MESSENGER	22.7	34.9	4.6	5.0			
Dawn	14.8	14.3	8.1	10.1	11.3	0.4	8.5
Strofio	6.2	1.6	0.9	1.3	0.7	0.8	0.8
ASPERA-3	0.9	0.9	0.8	0.6			
Deep Impact	5.3	4.0					
Moon Mineralogy Mapper	1.6	0.0					
Stardust	7.8						
Discovery Research	17.4	17.5	16.9	15.9	16.1	16.3	16.3
Discovery Management	7.5	9.0	11.3	11.8	12.1	12.4	12.5
New Frontiers	213.2	160.7	175.0	269.8	279.6	259.9	155.1
OSIRIS-REx	4.9	110.3	137.5	228.8	224.2	202.1	44.9
Other Missions and Data Analysis	208.3	50.5	37.5	41.0	55.4	57.8	110.1
New Frontiers Future Missions	2.6		0.0	0.0	0.0	2.5	65.3
Juno	189.2	31.4	17.8	18.1	21.8	29.9	33.4
New Horizons	9.7	12.4	13.3	16.4	26.8	18.5	4.5
New Frontiers Research	1.2	0.3					
New Frontiers Management	5.7	6.4	6.4	6.5	6.7	6.9	7.0

Planetary Science Program Content (cont'd)

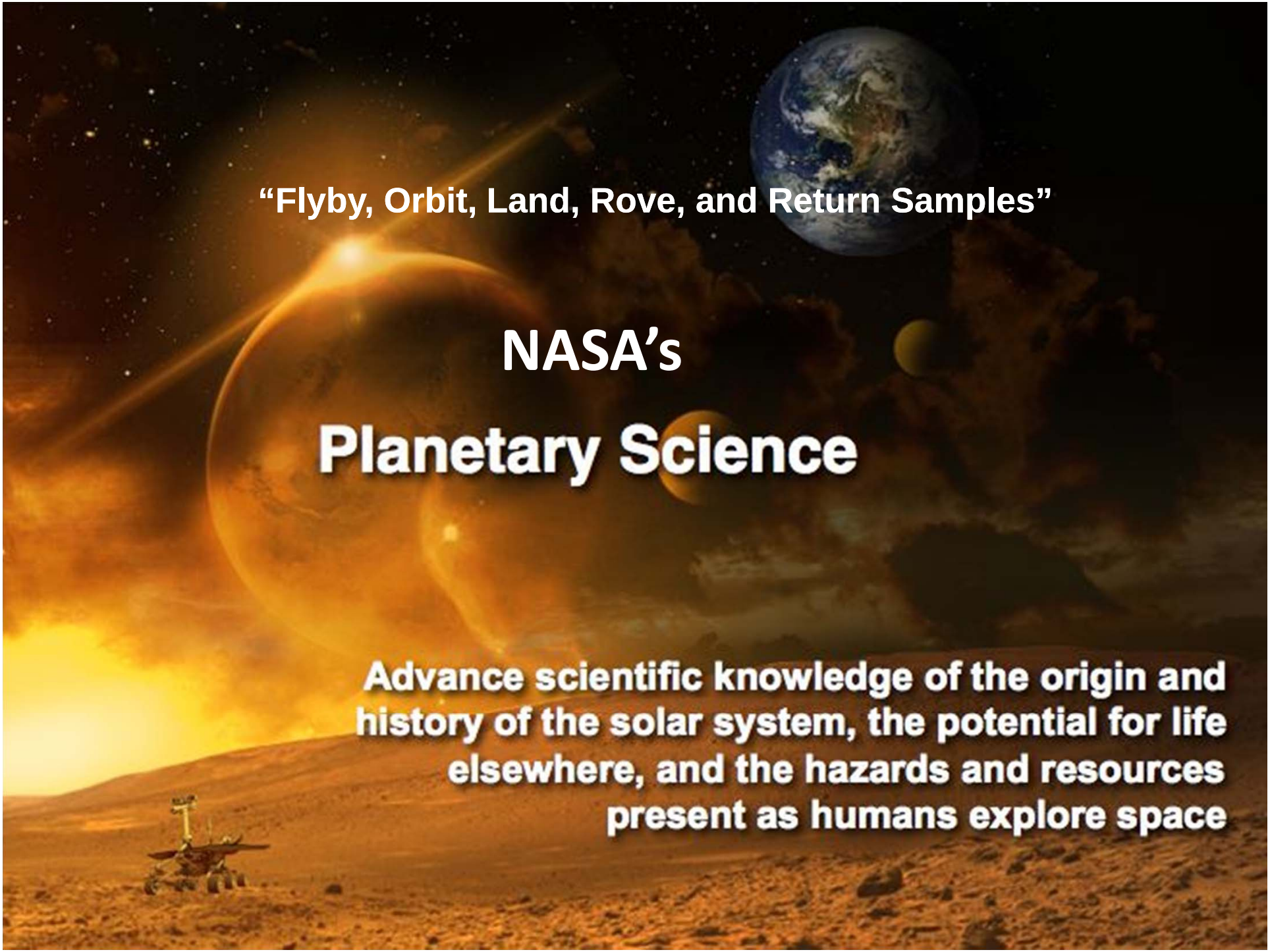
	FY 11	FY 12	FY 13	FY 14	FY 15	FY 16	FY 17
				(FY14-17 estimates are notional)			
Mars Exploration	547.4	587.0	360.8	227.7	188.7	266.9	503.1
MAVEN	160.6	245.7	146.4	37.6	17.3	5.3	
Other Missions and Data Analysis	386.8	341.4	214.4	190.1	171.4	261.6	503.1
Mars 2016/2018/MOMA/Future	46.6	43.8	62.0	72.8	72.8	151.7	346.1
2011 Mars Science Lab	242.9	174.0	65.0	38.5			
Mars Reconnaissance Orbiter 2005	30.1	40.4	0.1				
Mars Exploration Rover 2003	13.6	15.0	0.1				
Mars Odyssey 2001	10.1	12.8					
Mars Express	0.9	2.1					
Mars Extended Operations			53.7	40.1	56.3	51.2	51.4
Mars Mission Operations	1.6	1.8	1.8	1.8	1.9	1.9	1.9
Mars Research and Analysis	17.4	19.0	15.2	15.2	15.3	15.3	15.3
Mars Technology	2.5	5.0	3.0	4.0	7.0	23.0	75.0
Mars Program Management	21.0	27.5	13.5	17.6	18.1	18.5	13.4

Planetary Science Program Content (cont'd)

	FY 11	FY 12	FY 13	FY 14	FY 15	FY 16	FY 17
				(FY14-17 estimates are notional)			
Outer Planets	91.9	122.1	84.0	80.8	78.8	76.2	76.3
Cassini	60.0	61.4	59.7	59.0	59.0	59.0	59.0
Outer Planets Flagship	13.9	44.8	8.3	5.3	2.9		
Outer Planets Research	18.0	15.9	16.1	16.5	16.9	17.2	17.3
Technology	117.3	144.9	132.9	84.6	85.9	90.9	99.6
Nuclear Power Radioisotope System	73.1	83.1	66.5	47.5	50.8	55.6	59.2
Advanced Multi-Mission Operation System	31.8	35.2	36.2	29.0	29.3	29.4	29.5
Plutonium	3.5	10.0	14.5	4.8	2.4	2.4	2.5
In-Space Propulsion	8.1	15.7	14.6	3.2	3.4	3.4	8.5
Technology Planning	0.9	0.9	0.9				

Planetary Science FY12 and FY13 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
- Execute critical missions events in FY12:
  - Successfully land Curiosity Rover on Mars in August and begin its science data collection
  - Dawn completes observations at Vesta and departs for Ceres (arriving in 2015)
- LADEE and MAVEN in final phases of development for a 2013 LRD
- ASRG - will complete Engineering & Qual units and continue with life testing
- Completion of Pu-238 production restart study by DoE
- Down-select to one Discovery-12 mission for flight
- Conduct Senior Review for extended mission operations
- Acceleration of the identification and characterization of Near-Earth Objects
- Continue with science grant selections and awards in the R&A program


"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