Planetary Science and Mars Program

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Outline

- Planetary Recent Events
- Budget Overview:
  - Passed FY14 budget
  - President's FY15 budget
- Status of the next Discovery Opportunity
- Planetary Missions Overview
- Education and Public Outreach status
- Research & Analysis status

Planetary Science Missions and Outreach Events

2013

May – November – *Mars As Art* Exhibit at Dulles Airport Gallery

July 19 – Wave at Saturn and MESSENGER's Earth image from Mercury

July 31 – Curiosity Day on the Hill

August 6 – One Year Anniversary of Curiosity Landing on Mars

*** Completed**

September 6 – LADEE launch from Wallops Flight Facility, VA

October 1 – Close approach of Comet ISON to Mars – *Campaign Science*

October 9 – Juno flyby of Earth

November 27 – VESPER rocket launch observing Venus

November 18 - Launch of MAVEN from Cape Canaveral, FL

November 28 – Comet ISON Perihelion. Brightest view from Earth of Comet ISON

2014

January – EXCEED-HST observations of Io – *Campaign Science*

Late Summer - Curiosity arrives at Mt. Sharp

August 6 – 2nd Year Anniversary of Curiosity Landing on Mars

August – ESA's Rosetta mission arrives at Comet Churyumov–Gerasimenko

September 21 - MAVEN inserted in Mars orbit

October 19 – Comet Siding Spring encounters Mars

June/July – Mars2020 instrument selection announcement

Planetary Budget Overview for FY14

- Congress passed a budget for Planetary Science of $1.345B
- Budget elements include:
  - Research and Analysis: $130M
  - Near Earth Object Observation: up to $40.5M
  - Discovery: $285M
  - New Frontiers: $258M
  - Mars Exploration: $288M ($65M for Mars Rover 2020)
  - Outer Planets: $159M ($80M Europa)
  - Technology: $146M (including Pu-238 production)
- Instructions included:
  - Pre-formulation and/or formulation activities on the Europa mission including an AO for instrument development supporting the scientific goals of the mission outlined in the Decadal
  - Release the next Discovery AO – next AO Sept 2014

Planetary Science Budget FY15

	Op Plan	Enacted		Notional			
	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Planetary Science	1274.6	1345.0	1280.3	1304.9	1337.1	1355.7	1374.1
Planetary Science Research	195.8		255.8	280.5	284.4	283.3	278.4
Lunar Quest Program	63.8		0.0	0.0	0.0	0.0	0.0
Discovery	215.5	285.0	230.8	163.0	174.2	280.2	377.8
New Frontiers	158.8	258.0	281.5	254.7	110.0	51.1	45.9
Mars Exploration	369.5	288.0	279.3	381.7	547.8	573.1	518.8
Outer Planets	147.8	159.0	95.7	82.2	84.5	27.8	9.1
Technology	123.4	146.0	137.2	142.9	136.3	140.1	144.1

- President's proposed FY15 budget includes an *additional* SMD funding:
  - $15M for competed EPO activities
  - $50M in the Opportunity, Growth, and Security Initiative
- House Appropriations Committee approved the FY2015 Commerce-Justice-Science (CJS) appropriations bill
  - Planetary $1.45B ($302M for MEP; 24 month Discovery cadence)

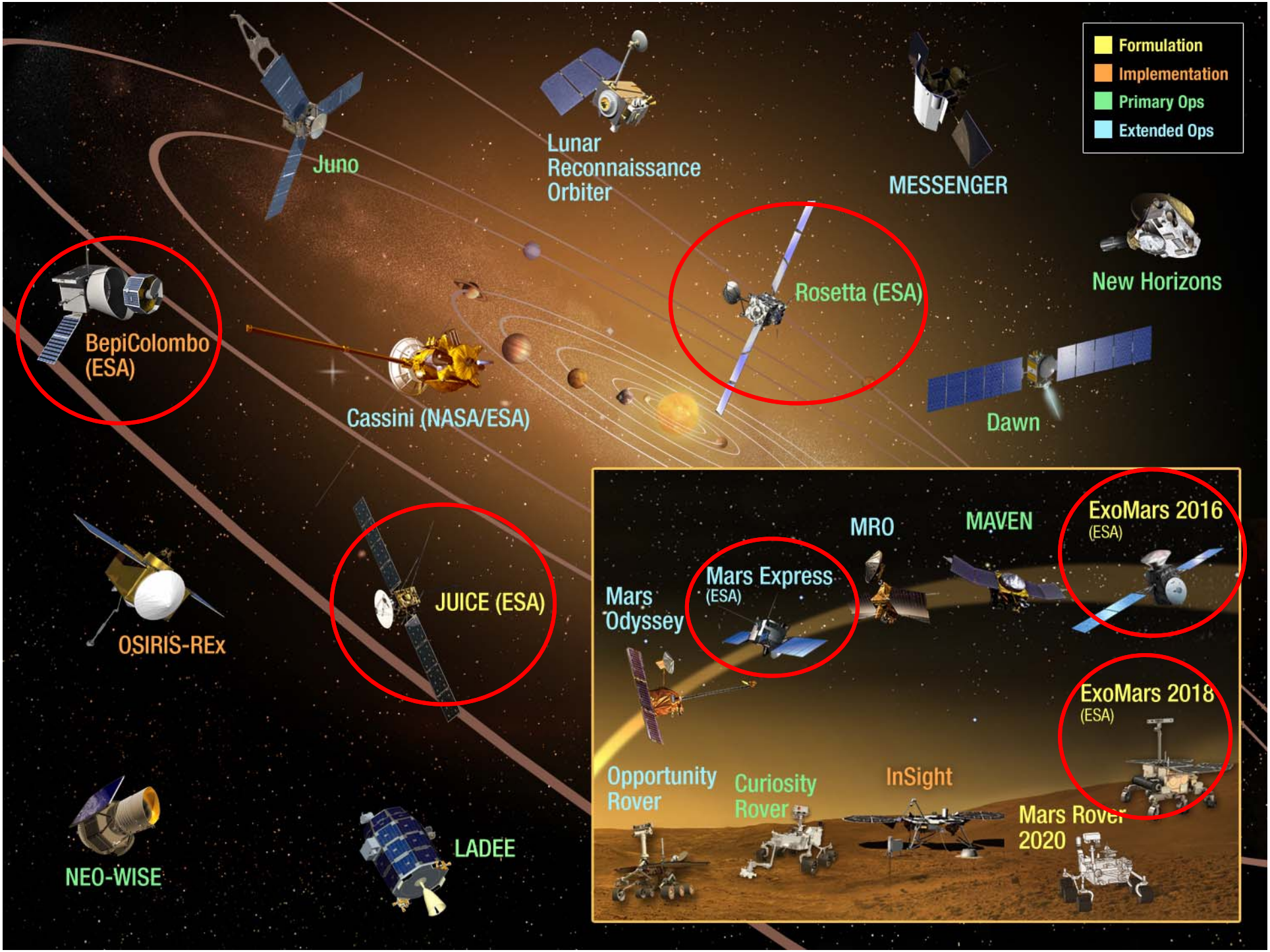
Discovery AO

Schedule Overview

- Anticipated Schedule:
  - Technology day to discuss tech options - end of March
  - Release of draft AO – May 2014
  - Release of final AO – September 2014
  - Pre-proposal conference – AO + 3 weeks
  - Proposals due – AO + 90 days
  - Selection of 2 - 3 $3M (RY) Phase A studies – May 2015
  - Concept Study Reports due – April 2016
  - Down selection of mission – October 2016
  - Launch Readiness Date – NLT December 2021
- Questions or input should be directed to: Dr. Michael New, michael.h.new@nasa.gov
- Full announcement:

  https://www.fbo.gov/spg/NASA/HQ/OPHQDC/NNH14ZDA004J/listing.html

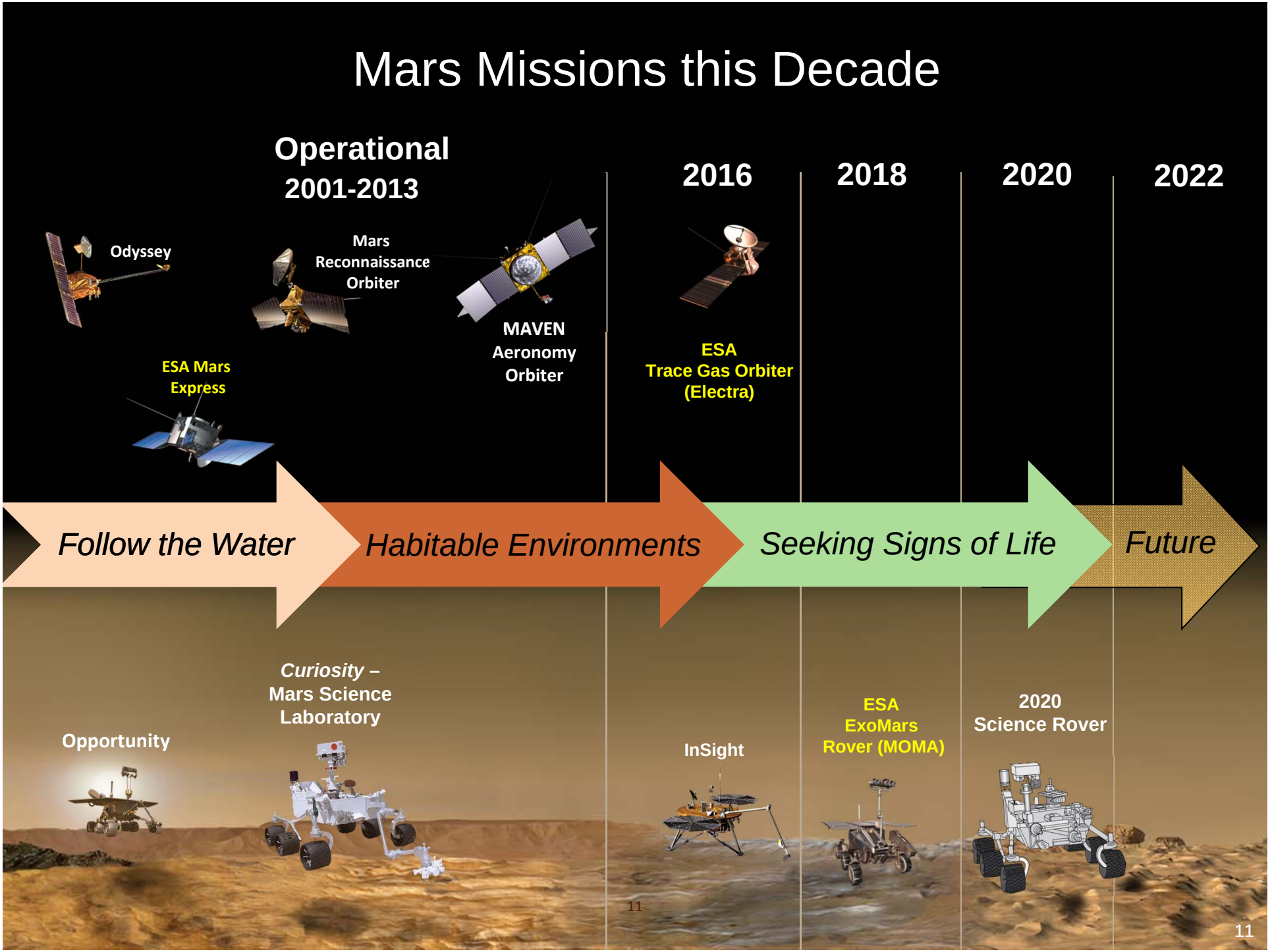
Planetary Missions


Formulation
Implementation
Primary Ops
Extended Ops
Juno
Lunar Reconnaissance Orbiter
MESSENGER
New Horizons
Rosetta (ESA)
BepiColombo (ESA)
Cassini (NASA/ESA)
Dawn
OSIRIS-REx
JUICE (ESA)
NEO-WISE
LADEE
Mars Odyssey
Mars Express (ESA)
MRO
MAVEN
ExoMars 2016 (ESA)
ExoMars 2018 (ESA)
Opportunity Rover
Curiosity Rover
InSight
Mars Rover 2020

Extended Missions Senior Review

- Guidelines issued Jan 31, 2014 with comment period
- Final guidelines & budget targets issued Feb 21, 2014
- Proposals due: April 11, 2014
- Review Panel date: ~May 2014
- Results announced: ~June 2014
- 2014 Senior Review missions:
  - Cassini, LRO, Opportunity, Mars Express, Mars Odyssey, MRO and Curiosity

Mars Missions this Decade

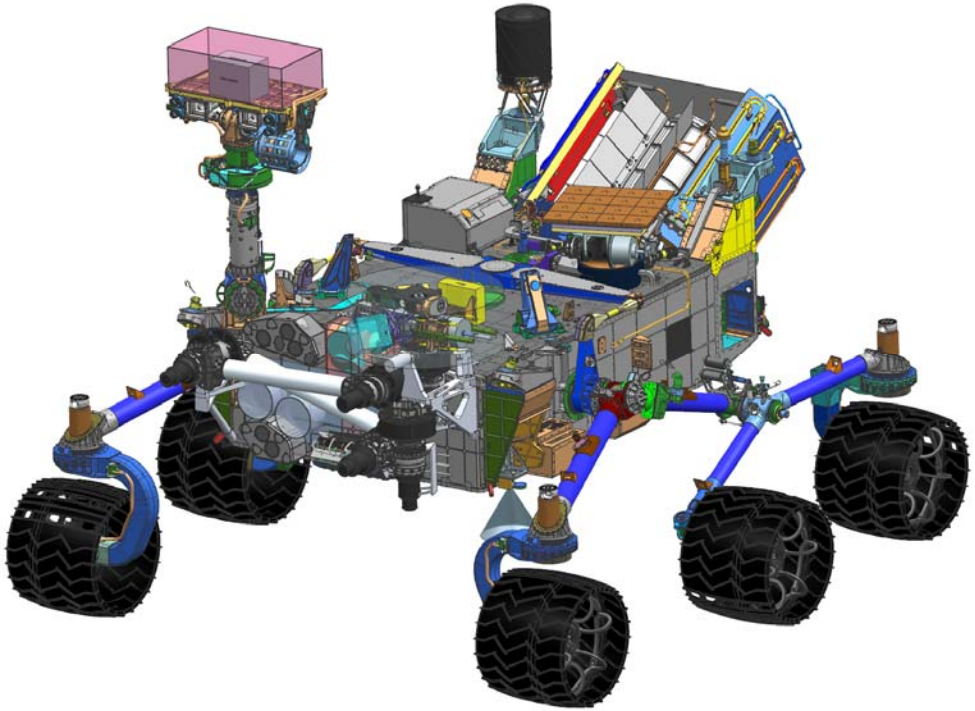


Seeking signs of life: Mars 2020 Rover

Conduct rigorous *in situ* science

Geologically diverse site of ancient habitability

Coordinated, nested context and fine-scale measurements



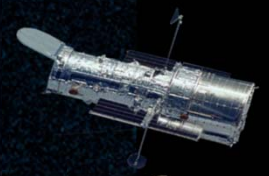
Enable the future

Critical ISRU and technology demonstrations required for future Mars exploration

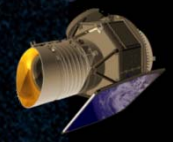
Returnable cache of samples

MSL heritage rover and moderate instrument suite stays within the resource constraints

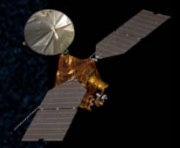
How NASA Space Assets Will Observe Comet Siding Spring



Hubble observed Siding Spring in October 2013, and Jan/Mar 2014



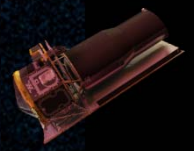
NeoWISE observed the comet in January and will again in July 2014



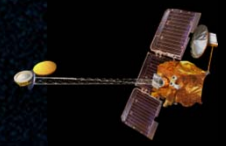
Mars Reconnaissance Orbiter will attempt observations beginning in October 2014

Swift observed the comet three times between Nov 2013 and February 2014

ESA's Mars Express may attempt observations in October 2014



Spitzer observed the comet March 2014



Mars Odyssey will attempt observations beginning in October 2014

Closest Approach to Mars on October 19, 2014

(Items in yellow successfully observed the comet so far)

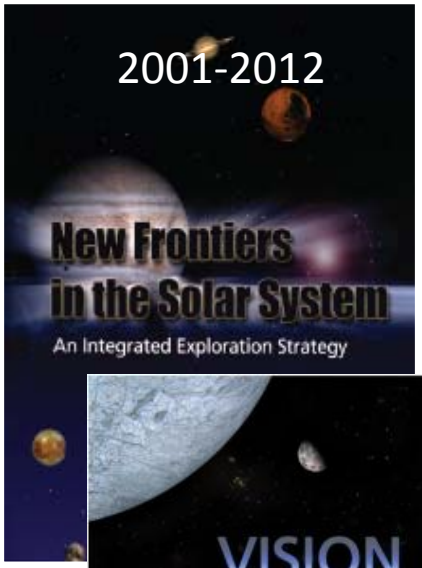
For more information, visit:
http://mars.nasa.gov/comets/sidingspring

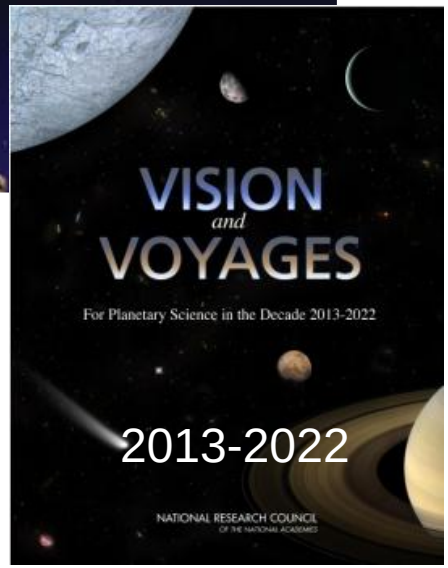
Opportunity will attempt observations in October 2014

Curiosity will attempt observations in October 2014

Europa and the Decadal Survey

- The Decadal Survey provided 5 science goals for Europa exploration
  1. Characterize the ocean
  2. Characterize the ice shell and the surface-ice-ocean exchange
  3. Determine global composition and chemistry, especially with regard to habitability
  4. Understand the surface features and geology (and locate landing sites for future exploration)
  5. Understand the space environment
- The Decadal Survey considered a comprehensive mission concept called the Jupiter Europa Orbiter (JEO)
  - NRC's independent Cost And Technical Estimate (CATE) for JEO deemed it unaffordable at $4.7B, and therefore it was the "second highest priority Flagship mission" based on "pragmatic reasons associated with the spending profiles"





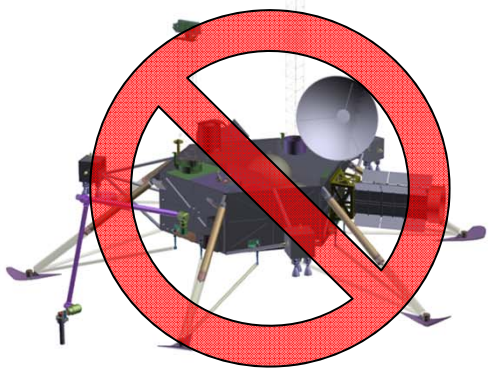
"NASA should immediately undertake an effort to find major cost reduction for JEO"

Options for Reduced Cost Europa Missions

- The year following the Decadal Survey was spent executing the recommendation to find major cost reductions
  - The highly capable but complex JEO concept was split into three far simpler elements
  - These three mission concepts were independent, stand alone missions each with its own meritorious science
- The purpose of this effort was to define and validate a set of minimum concepts that demonstrate missions exist at the lower end of the cost spectrum (~$2B) that still provide significant science return

Multiple-Flyby in Jupiter Orbit

Europa Orbiter



Europa Lander

Path Forward

- Continue Europa mission concept pre-formulation activities looking at several potential options:
  - Refine the Europa Clipper concept taking into account the recent potential Europa plume discovery
  - Release a Request for Information (RFI) soliciting brief descriptions of mission concepts that address Decadal Survey science objectives for Europa via missions costing less than $1B (FY15 dollars, phases A-E, excluding launch vehicle)
  - Study various launch vehicle options including SLS

- As directed by Congress: Release competitive instrument AO for Phase A risk reduction
  - This would address the long standing and long lead risk identified by all previous Europa mission studies and independent reviews

Education and Public Outreach (EPO)

EPO Background

- Recent events require a new PSD strategy on EPO
  - In FY14 and beyond, $5.6M/year removed from PSD budgets associated with EPO (in addition to EPOESS & Forum budgets)
  - FY14 Appropriation language guidance has informed PSD approach:

"*Education and Public Outreach* (EPO).--Consistent with longstanding NASA practice, the agreement maintains EPO funding within the Science Mission Directorate (SMD). The current method of distributing EPO funds within SMD, however, may not produce the most efficient allocation of limited resources. For fiscal year 2015 and future years, NASA shall consider consolidating EPO funding within each SMD division and allocating funds to individual activities based on an assessment of division-wide priorities and program effectiveness."

PSD EPO Approach

- FY14 will be a transition year:
  - PSD plans to work with the community to transition EPO
  - At a minimum and consistent with the 2013 Decadal Survey, PSD efforts will: Contribute to Increased US Scientific Literacy for the General Public
- FY15 President's budget request provides $15M to SMD for EPO
  - A new plan is under construction and will be released before October 1st
  - PSD will restructure consistent with guidance from: 2013 Decadal Survey, CoSTEM, OMB, Congress, and other NRC report recommendations
- Our value to add towards this goal is from our knowledge experts and our exciting planetary content

Research & Analysis Program

Reorganization at a glance

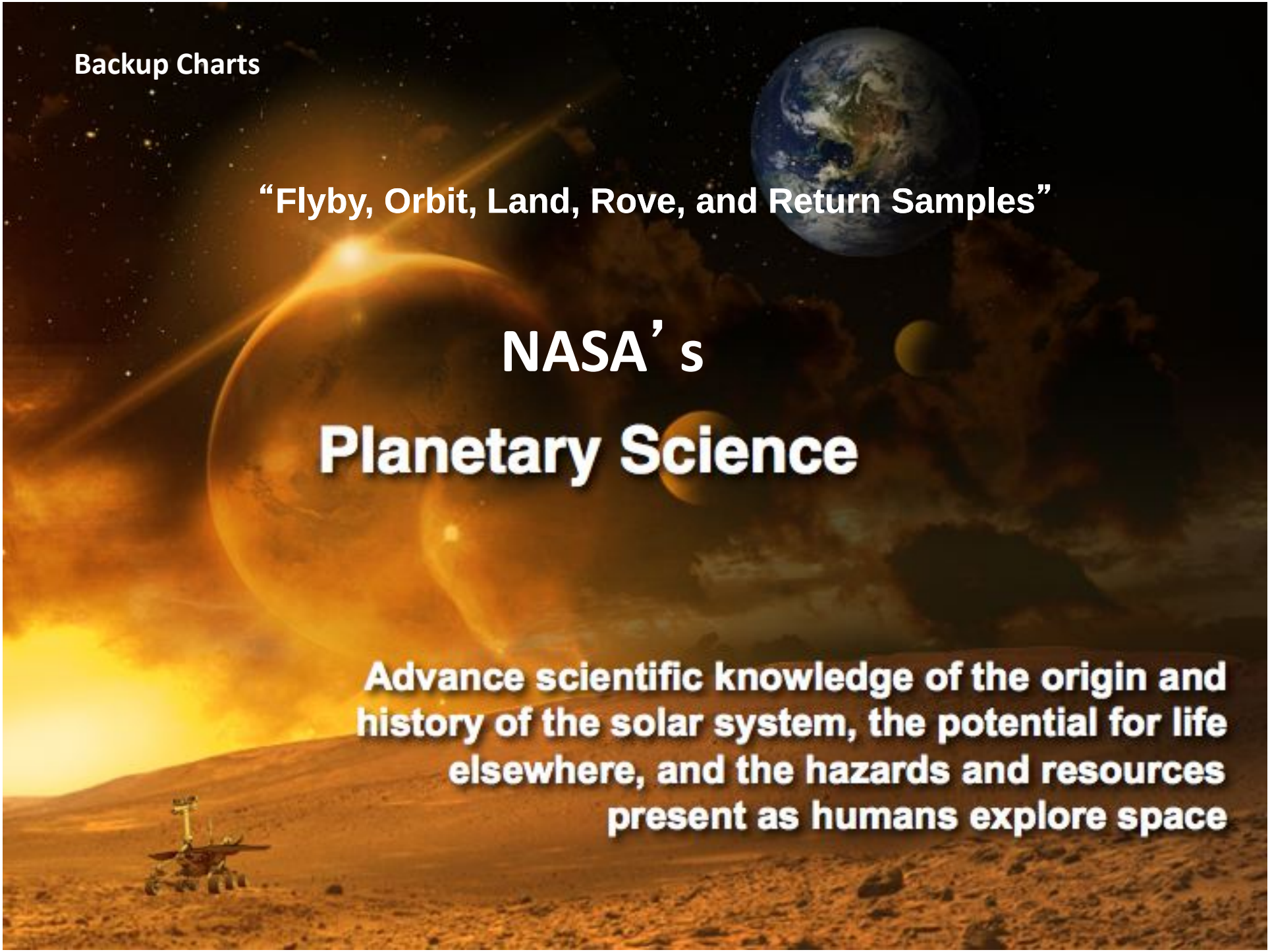
- ROSES13 has 20 calls; ROSES14 has 19 calls with 7 that remain the same
- ROSES14 will be funded out of FY15 funding
- All calls address division science goals supporting NASA's strategic plan

Core Research	Strategic	Focused
Emerging Worlds	PDART (data archiving, tools)	ETIPS (emerging topics)
Solar System Workings	PSTAR (analogues)	LDAP (lunar data analysis)
Habitable Worlds	Exoplanets (joint with Astro)	CDAPS
Exobiology	DDAP	DFRAP
Solar System Observations	LARS	
Core Technology	MDAP	
MatISSE	Planetary Protection	
PICASSO	NAI (not solicited in ROSES)	
Planetary Major Equipment	SSERVI (not solicited in ROSES)	

New program
Not solicited in ROSES 2014
Unchanged

ROSES 2014 Planetary Due Dates

Program Element	Step-1 Proposal Due Date	Step-2 Proposal Due Date
Exoplanets	March 31, 2014	May 23, 2014
Emerging Worlds	March 31, 2014	May 30 2014
PPR	April 7, 2014	June 6, 2014
Solar System Observations	April 7, 2014	June 6, 2014
Exobiology	April 14, 2014	June 3, 2014
MatISSE	April 21, 2014	June 20, 2014
LARS	April 28, 2014	June 27, 2014
Hayabusa 2 PSP	*May 19, 2014*	*July 18, 2014*
Solar System Workings	May 23, 2014	July 25 2014
PDART	*July 14, 2014*	*September 12, 2014*
DDAP	July 21, 2014	September 19, 2014
PSTAR	July 25, 2014	September 26, 2014
CDAP	July 28, 2014	September 26, 2014
MDAP	August 4, 2014	October 3, 2014
LDAP	*August 11, 2014*	*October 10, 2014*
DFRAP	*August 18, 2014*	*October 17, 2014*
PICASSO	September 15, 2014	November 14, 2014
Habitable Worlds	November 24, 2014	January 23, 2015

Currently under review (Red)

Backup Charts