

NASA's Planetary Science Program Status

Presentation to Division of Planetary Science

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October 6, 2009

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Outline

- Administrative
- Planetary Missions Overview
- Announcements of Opportunity
- Outer Planets
- R&A
- International Agreements

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Administrative

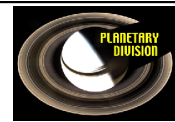


- HQ positions:
 - Astrobiology Science Lead and PPO closed selections to be announced
- GSFC position:
 - Space Scientist specializing in planetary studies and science data management (PDS)
- Augustine Report to be delivered to NASA
 - Exploration objectives may change
 - ESMD maintains its commitment in NLSI and LASER
- Congressional Actions:
 - NASA currently operating on a continuing resolution
 - DOE budget passed without a restart of Pu-238

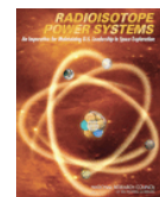
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National Academy Report



- RADIOISOTOPE POWER SYSTEMS (RPS) : An Imperative for Maintaining U.S. Leadership in Space Exploration (April 2009)
 - William Hoover and Ralph McNutt, Co-Chairs
- Overview:
 - Pu-238 is the only viable fuel for RPSs
 - Pu-238 is no longer being manufactured anywhere
 - NASA will soon use all available Pu-238
 - NASA has already been making mission-limiting decisions based on the short supply of Pu-238
 - Not in New Frontiers-3, solar probe ...
- Meeting NASA's future needs will require:
 - 1) immediate action by DOE to restart production and
 - 2) timely development and flight testing of advanced RPS



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Congressional Actions: Pu



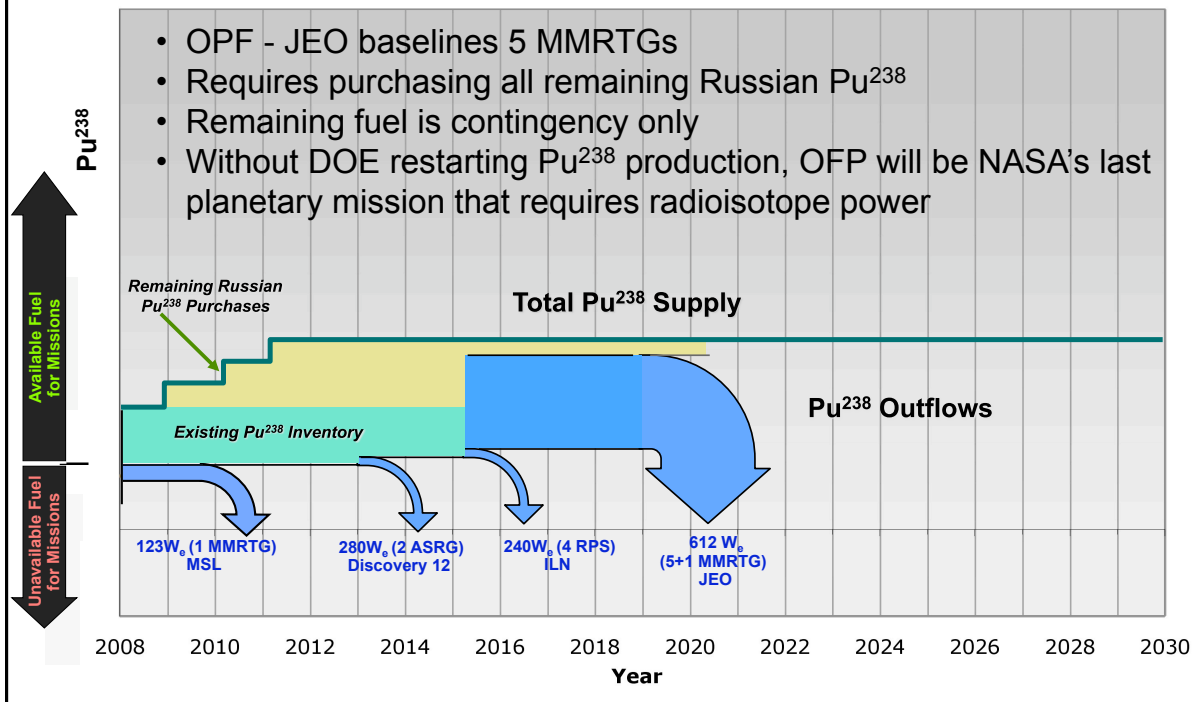
- Presidents budget request for DOE
 - \$30M for restarting production of plutonium-238
 - Start preliminary design and engineering
- DOE FY10 appropriations bill (H.R. 3183)
 - Senate: Zero funding for the restart of Pu-238 production
 - House: \$10M for the restart of Pu-238 production
- Appropriations Conferees results:
 - Adopted Senate position of zero funding
 - Stating: *"Pu-238 Production Restart Project.- ... [a] start-up plan which shall include the role and contribution of major users of Pu-238, such as the NASA, ... shall be submitted with the fiscal year 2011 budget...."*
- NASA will work with DOE to create such a plan while we continue to maintain the testing of advanced RPS

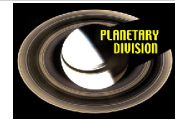


Plutonium Supply vs Planetary Science Demand

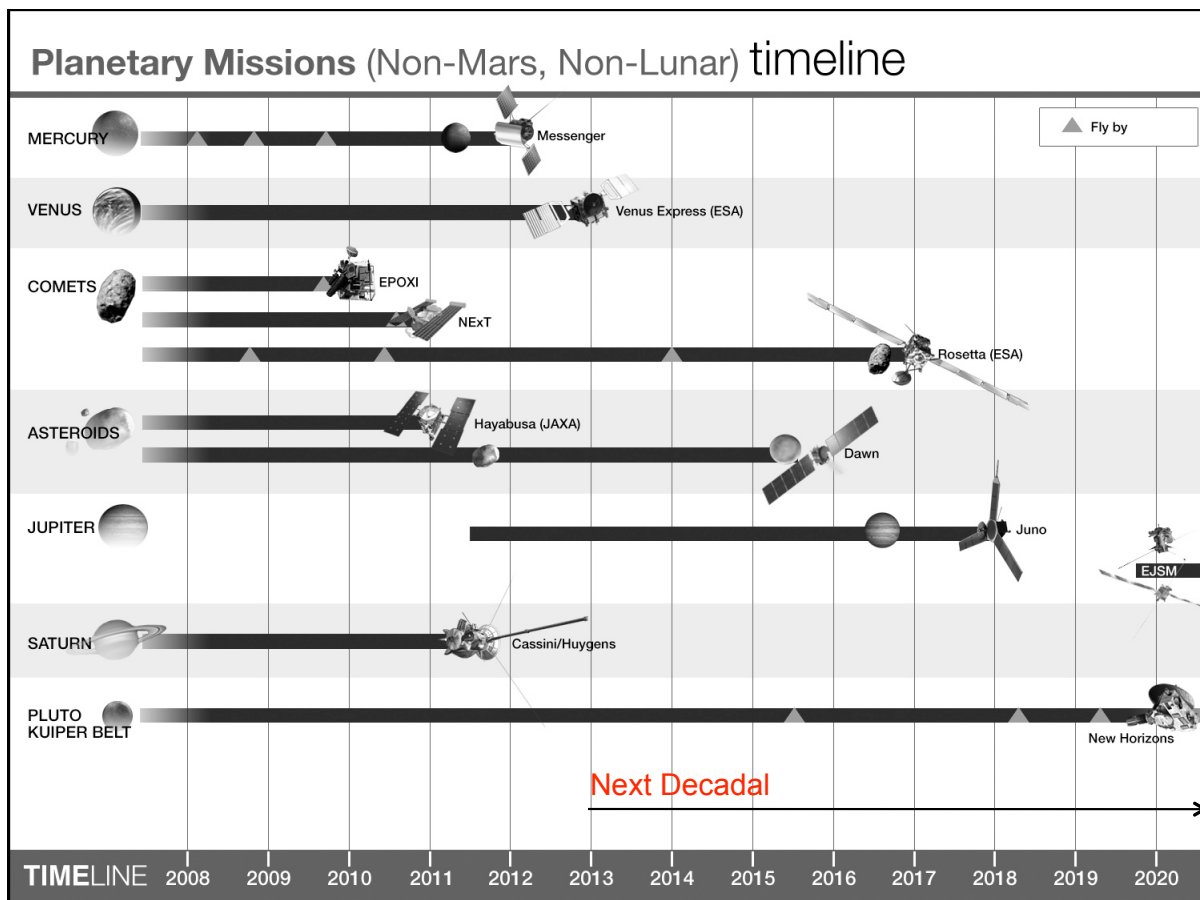


The era of special missions may be coming to an end

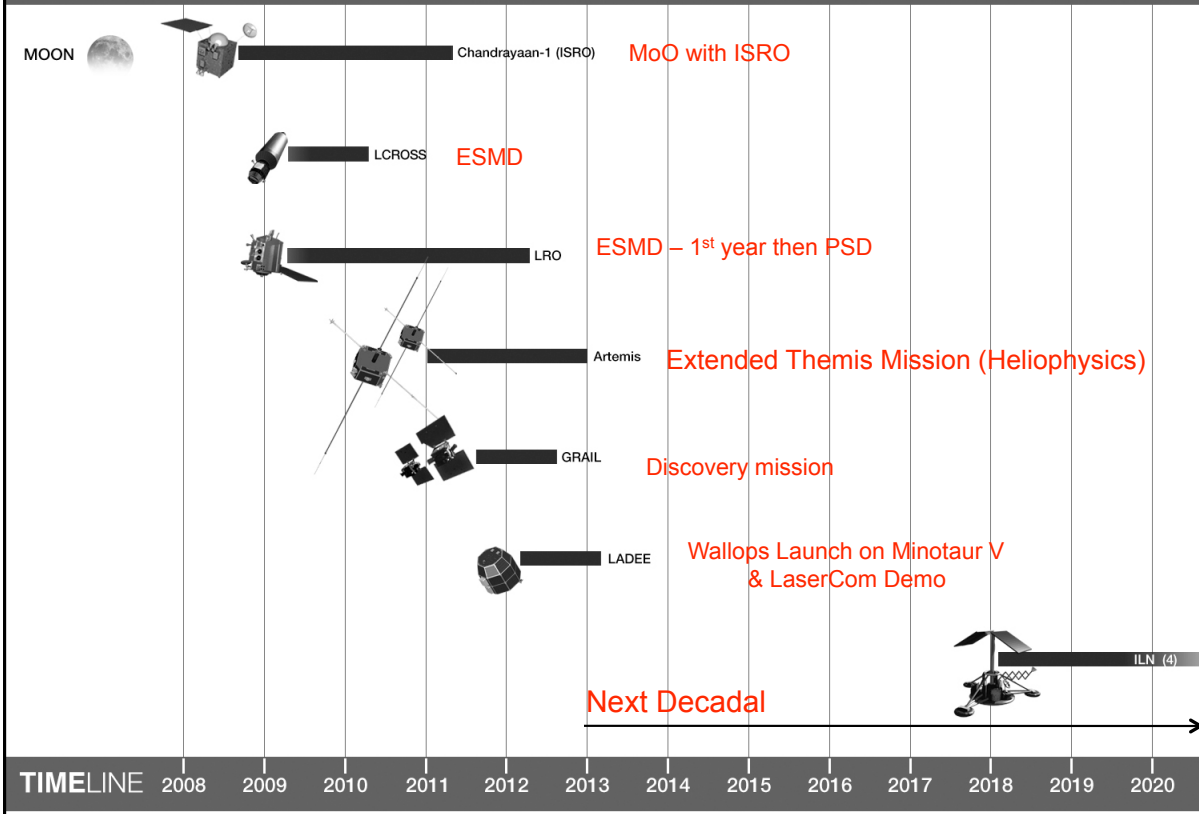




Mission Overview

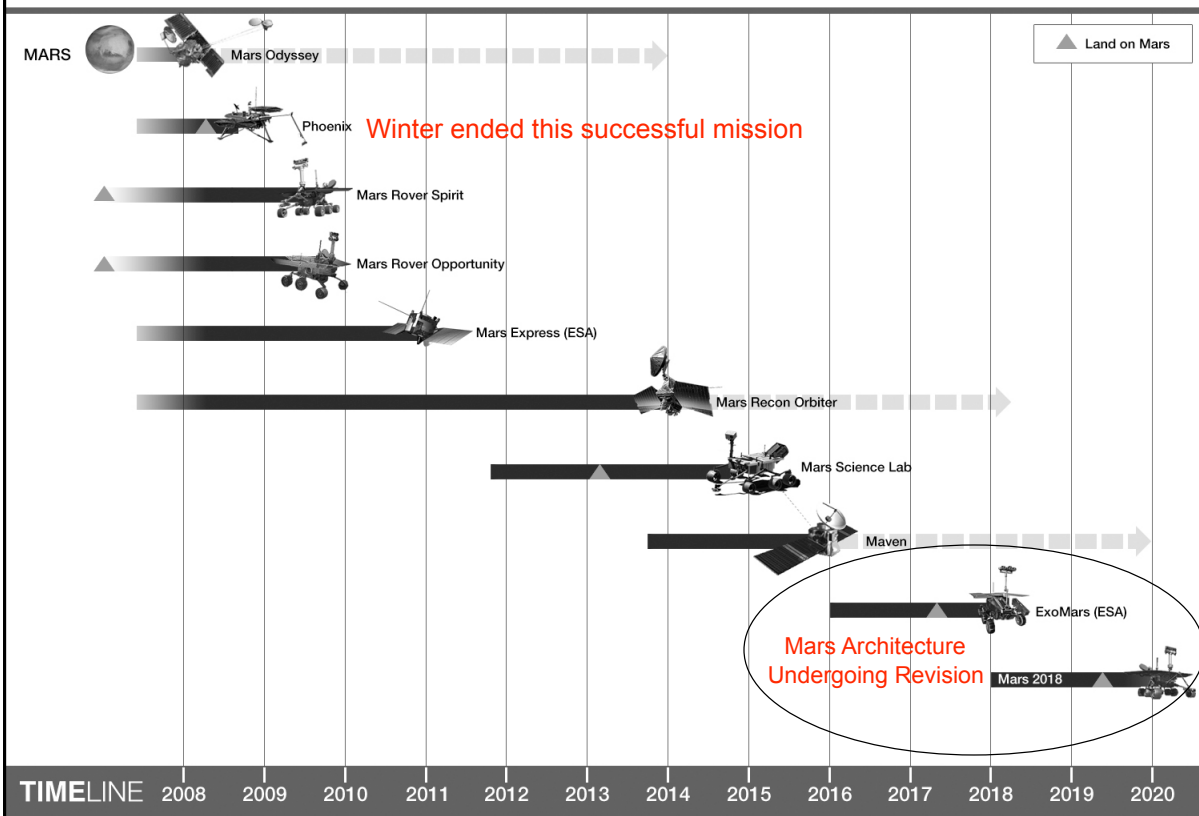


Lunar Mission timeline



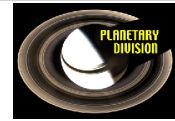
Mars Mission timeline

Next Decadal



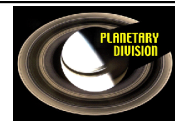


Mars Science Laboratory



- Delayed to 2011 due to hardware development delays
- Technical challenges still remain
 - Actuators, avionics, instrument issues ...
- Already provided additional funding of \$400M as an early estimate of what would be needed to complete
- Ready to Proceed Review in Nov. 2009
 - Expecting additional funding requirement (\$15-115M)
 - Can accommodate some of this without mission delays or cancelations
 - No cuts to R&A planned
- Plan will be reviewed by the Planetary Science Subcommittee (PSS) before execution

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New Frontiers & Discovery & SALMON

PI Mission Opportunities

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New Frontiers Program



1st NF mission
New Horizons:

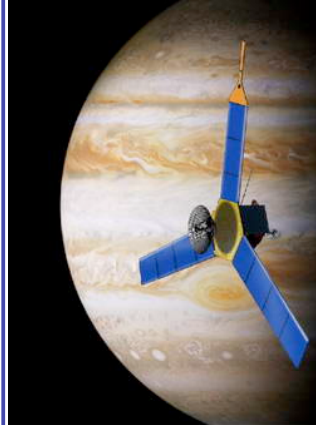
Pluto-Kuiper Belt Mission



Launched January 2006
Arrives July 2015

2nd NF mission
JUNO:

Jupiter Polar Orbiter Mission



August 2011 launch

3rd NF mission AO

South Pole -
Aitken Basin Sample
Return

Comet Surface
Sample Return

Venus In Situ
Explorer

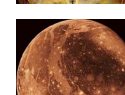
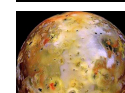
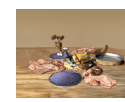
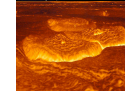
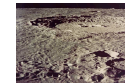
Network Science

Trojan/Centaur

Asteroid Sample Return

Io Observer

Ganymede Observer



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New Frontier-3 Announcement



- Open competition for PI class missions of strategic importance to Planetary Science in the < \$1B class
 - Select up to 3 for a 10 mo. Phase-A then a downselect to 1
 - Launch window beginning late CY 2016 ending NLT the end of CY 2018, according to target
 - Technology infusion:
 - NEXT ion propulsion system & Advanced Materials Bi-propellant rocket
- Schedule:
 - Proposals delivered July 31, 2009
 - Downselect in January 2010

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Discovery Program

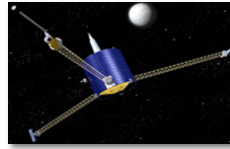


Completed

Mars evolution:
Mars Pathfinder (1996-1997)



Lunar formation:
Lunar Prospector (1998-1999)

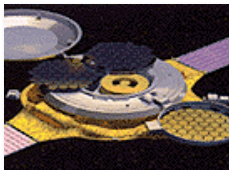


NEO characteristics:
NEAR (1996-1999)

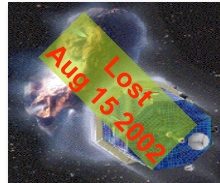


Completed / In Flight

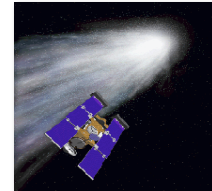
Solar wind sampling:
Genesis (2001-2004)



Comet diversity:
CONTOUR

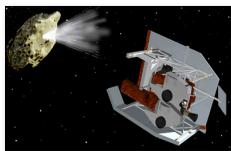


Nature of dust/coma:
Stardust(1999-2006)

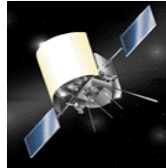


In Flight / In Development

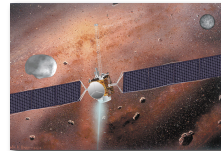
Comet internal structure:
Deep Impact (2005-2006)



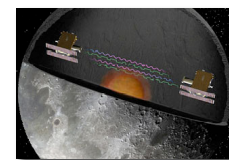
Mercury environment:
MESSENGER (2004-2012)



Main-belt asteroids:
Dawn (2007-2015)



Lunar Internal Structure
GRAIL (2011-2012)



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Discovery-12 Announcement



- Planetary Decadal science for PI missions
 - Across entire solar system (including Mars)
 - Cost Cap: \$425M FY10 (without LV)
 - Selection: 2 to 3 missions for a 9 mo. Phase-A then downselect to 1
 - Launch date NLT December 31, 2016
- ASRG is provided GFE as an option
- Schedule:
 - Draft AO to be released pending approved Congressional FY10 budget
 - Proposals due 90 days after AO release

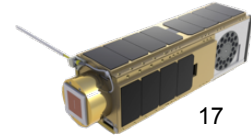
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SALMON – H3



- Research relevant to each of the astrobiology goals or fundamental space biology (ESMD) can be performed using small satellites
 - <http://astrobiology.arc.nasa.gov/roadmap>
- Small satellite missions run out of the Small Spacecraft Division at Ames Research Center
 - Launch accommodations via ARC agreements with providers (Minotaur, others)
- Proposals due mid-December 2009
- Launch no later than mid-2012
- May propose to utilize or modify existing hardware, or to support flight of PI-constructed hardware
 - Previous missions: Genesat, Pharmasat
 - Next mission: OREO

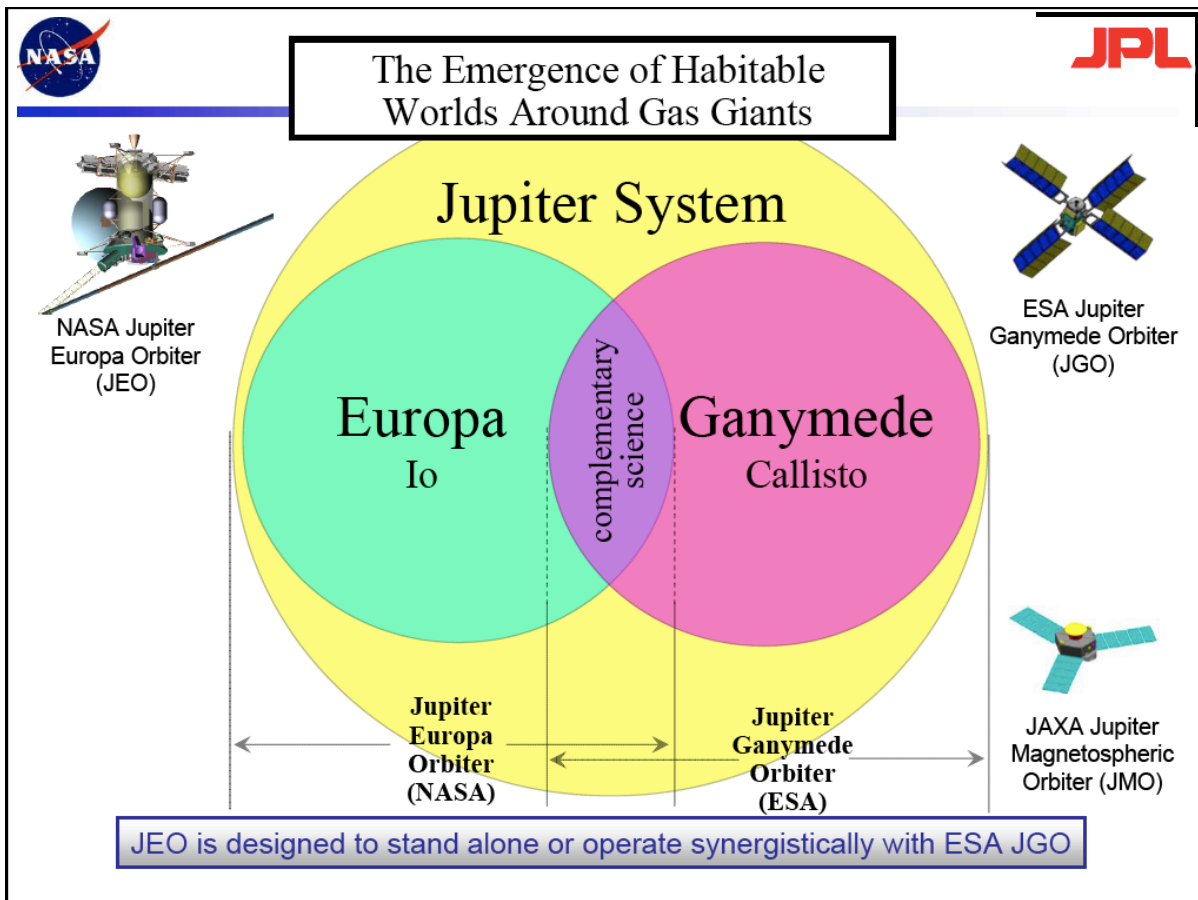
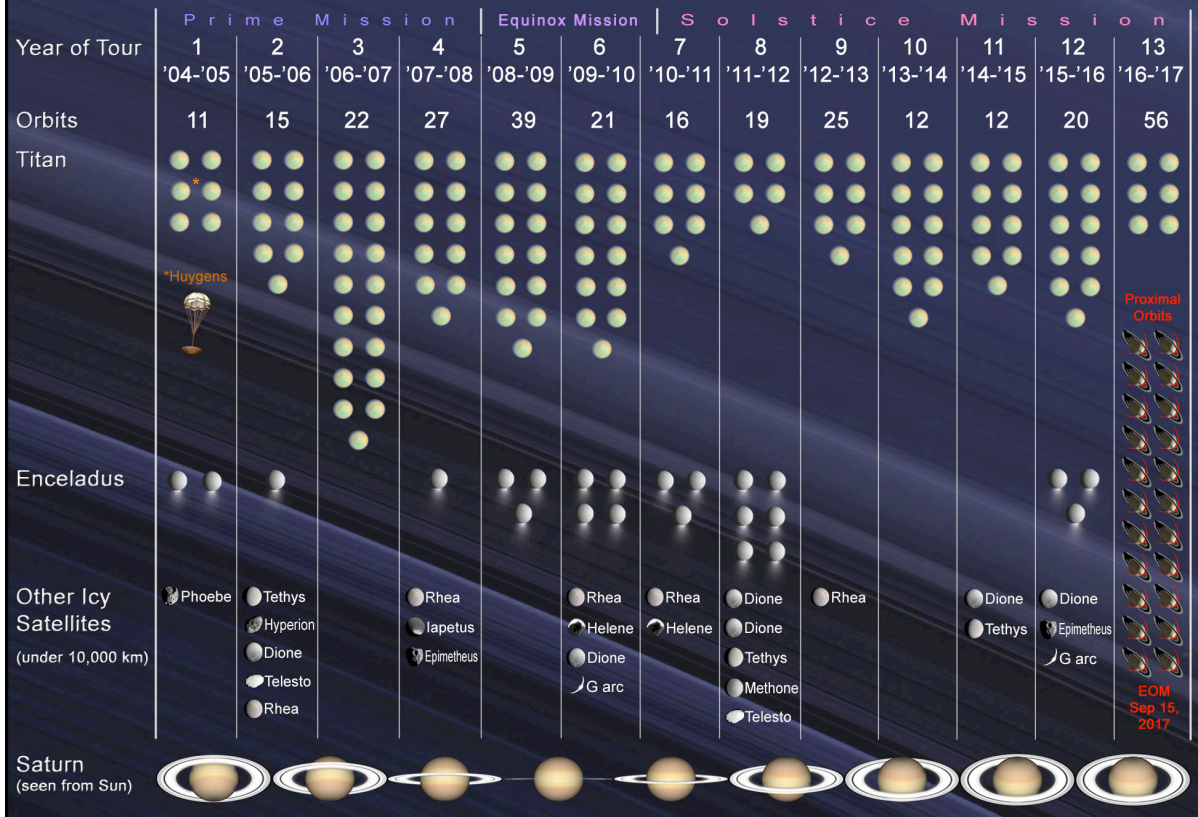


Outer Planets Flagships

Cassini
Europa & Ganymede missions

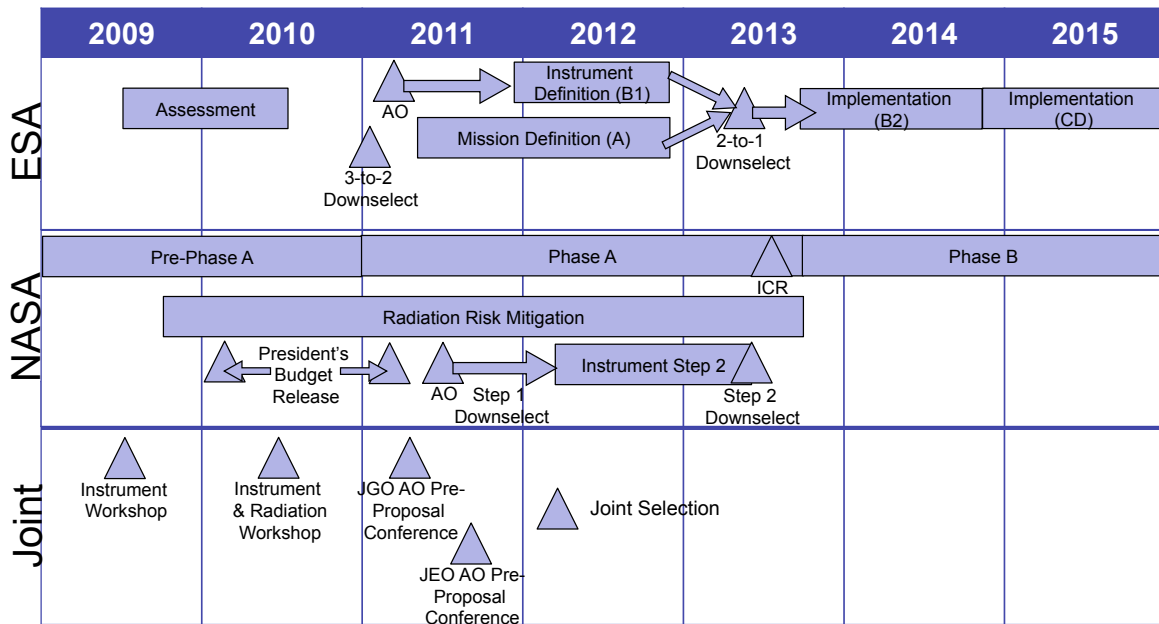
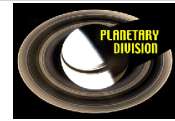
Cassini Mission Overview

Four-Year Prime Tour, Equinox Mission, and Solstice Mission (Proposed), July 2004 - July 2017





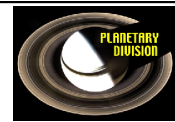
NASA and ESA Schedules



• Continued discussions on schedule & AO coordination

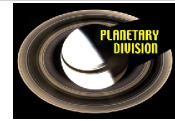


Supporting Research & Technology Program

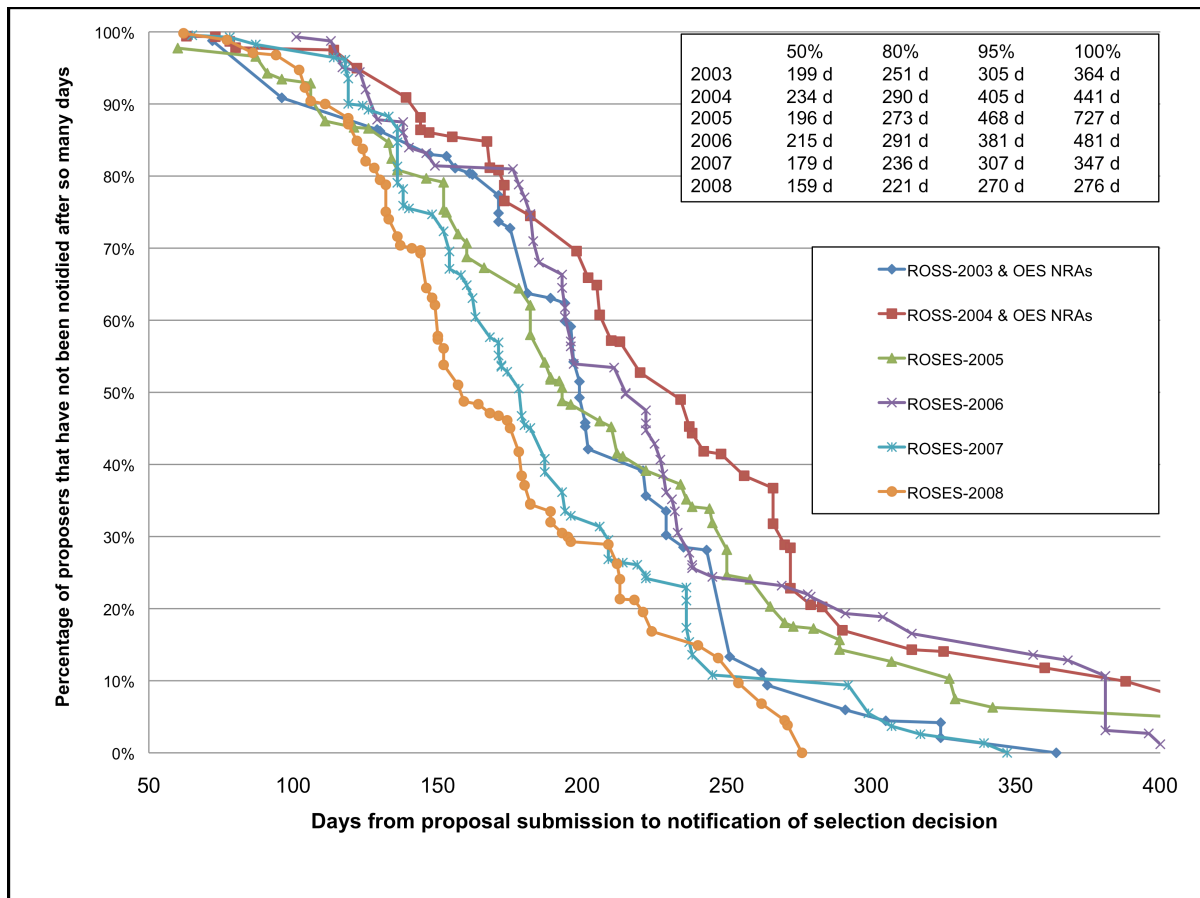


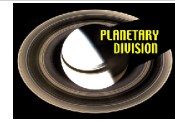


SR&T Program Elements



- Research & Analysis (ROSES)
- Astrobiology Institute
- Lunar Science Institute
- Planetary Data System (PDS)
- Astromaterials Curation Facility (JSC)
- Total Budget over time (details posted on SARA):
 - FY03: \$152M
 - FY04: \$177M
 - FY05: \$185M
 - FY06: \$163M
 - FY07: \$149M
 - FY08: \$180M
 - FY09: \$207M
 - FY10: \$215M Pending FY10 budget from Congress





International Agreements

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International Collaborations

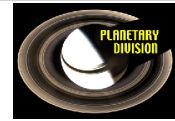


- Many planetary PI missions have foreign instruments (ie: Dawn, Juno...)
- Agreements on foreign missions:
 - ESA: Venus Express, Mars Express, ExoMars, Rosetta
 - ASI: BepiColombo (recently selected)
 - JAXA: Hayabusa
 - ISRO: Chandrayaan-1
 - Statement of Intent – 9 countries for ILN
- Developing Agreements:
 - ESA: OPF, Mars 16, 18, 20 ...
 - JAXA: Venus Climate Orbiter

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What's Coming Up for PSD



2010

- June 13 - Hayabusa (JAXA) asteroid sample return
- July 10 – Rosetta (ESA) closest approach for Lutetia
- Nov 4 - EPOXI encounters comet Hartley 2

2011

- Feb 14 - Stardust NExT encounters comet Tempel-1
- Mar 18 - MESSENGER orbit insertion at Mercury
- Aug - Dawn orbit insertion at asteroid Vesta
- Aug - Juno launch to Jupiter
- Sept - GRAIL launch to the Moon
- Sept – LRO transitions to Planetary Science Division
- Oct - MSL launch to Mars

2012

- May - LADEE launch to the Moon
- Aug - MSL lands on Mars

