

# Planetary Science Division Status Report

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NASA, Planetary Science Division

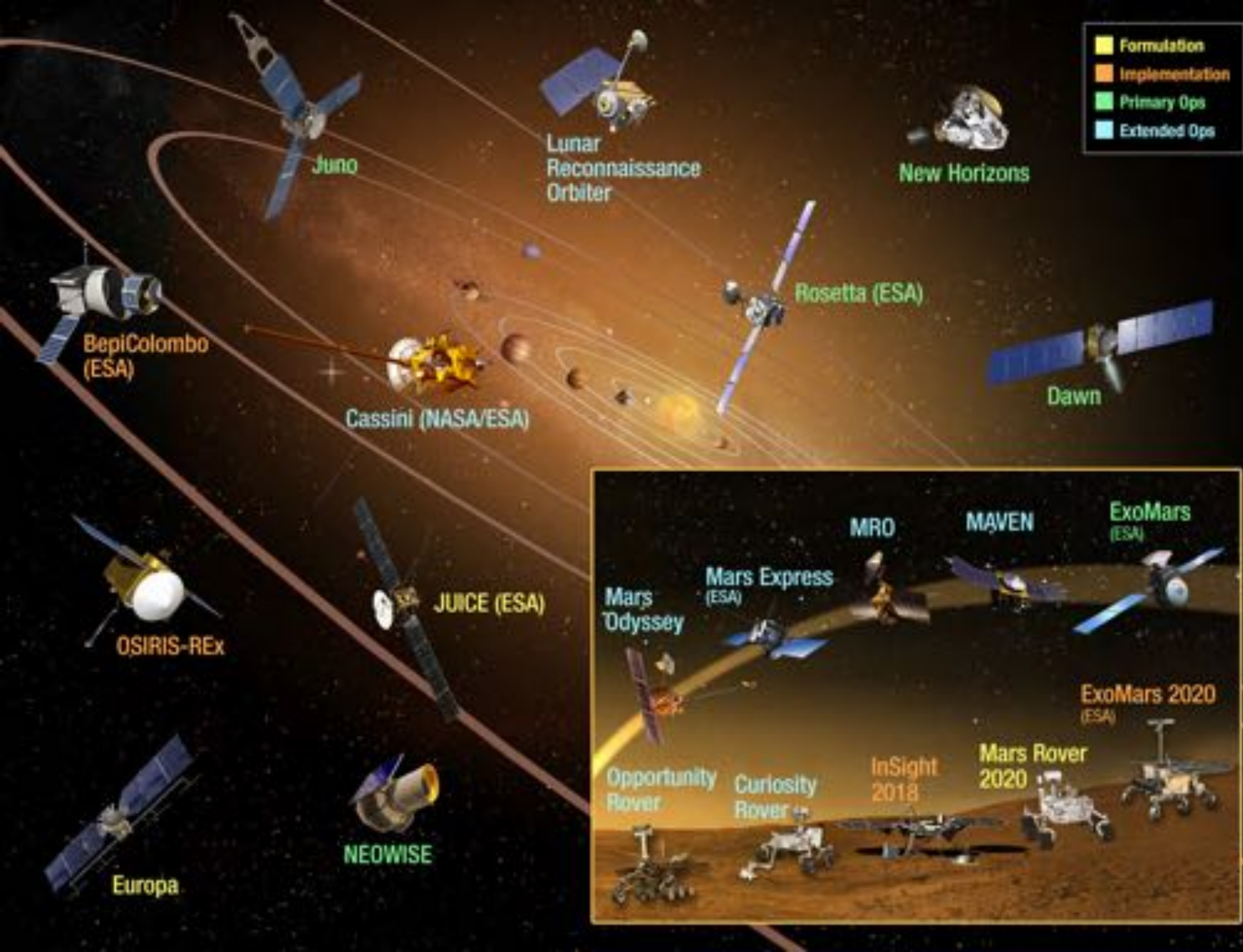
June 29, 2016

Presentation at SBAG



# Outline

- Mission Overview
- Discovery Program
- New Frontiers Programs
- Mars Exploration Program
- NRC studies and schedule for the mid-term





# Planetary Science Missions Events

## 2014

- July – *Mars 2020* Rover instrument selection announcement \* **Completed**
- August 6 – 2<sup>nd</sup> Year Anniversary of *Curiosity* Landing on Mars
- September 21 – *MAVEN* inserted in Mars orbit
- October 19 – Comet Siding Spring encountered Mars
- September – *Curiosity* arrives at Mt. Sharp
- November 12 – ESA's *Rosetta* mission lands on Comet Churyumov–Gerasimenko
- December 2/3 – Launch of *Hayabusa-2* to asteroid 1999 JU<sub>3</sub>

## 2015

- March 6 – *Dawn* inserted into orbit around dwarf planet Ceres
- April 30 – *MESSENGER* spacecraft impacted Mercury
- May 26 – Europa instrument Step 1 selection
- July 14 – *New Horizons* flies through the Pluto system
- September – Discovery 2014 Step 1 selection
- December 6 – *Akatsuki* inserted into orbit around Venus

## 2016

- March – Launch of ESA's *ExoMars Trace Gas Orbiter*
- July 4 – *Juno* inserted in Jupiter orbit
- July 20 – 40<sup>th</sup> Anniversary of the Viking missions
- September 8 – Launch of Asteroid mission *OSIRIS – REx* to asteroid Bennu
- Cassini* begins plane change maneuver for the “Grand Finale”
- Late 2016 – Discovery 2014 Step 2 selection

# Discovery Program





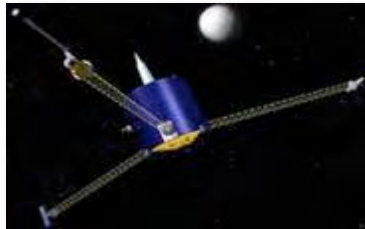
# Discovery Program

Completed

**Mars evolution:  
Mars Pathfinder (1996-1997)**



**Lunar formation:  
Lunar Prospector (1998-1999)**



**NEO characteristics:  
NEAR (1996-1999)**



**Solar wind sampling:  
Genesis (2001-2004)**



Completed

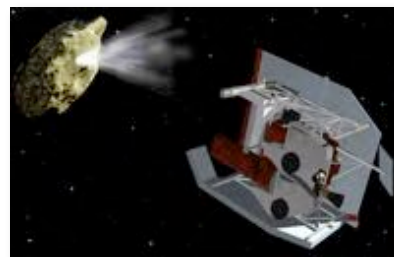
**Comet diversity:  
CONTOUR (2002)**



**Nature of dust/coma:  
Stardust (1999-2011)**



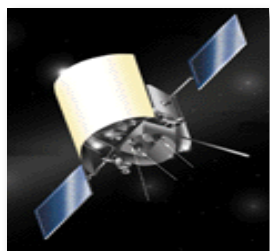
**Comet internal structure:  
Deep Impact (2005-2012)**



**Lunar Internal Structure  
GRAIL (2011-2012)**



**Mercury environment:  
MESSENGER (2004-2015)**



**Main-belt asteroids:  
Dawn (2007-2016)**



**Lunar surface:  
LRO (2009-TBD)**



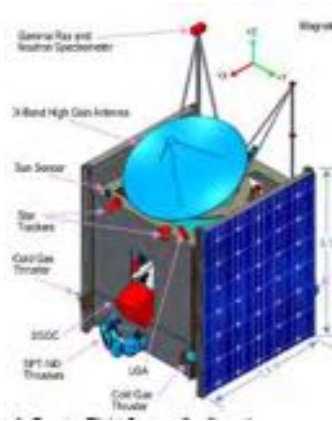
**ESA/Mercury Surface:  
Strofio (2017-TBD)**



**Mars Interior:  
InSight (2018)**



# Discovery Selections 2014



Psyche: Journey to a Metal World  
PI: Linda Elkins-Tanton, ASU  
**Deep-Space Optical Comm (DSOC)**



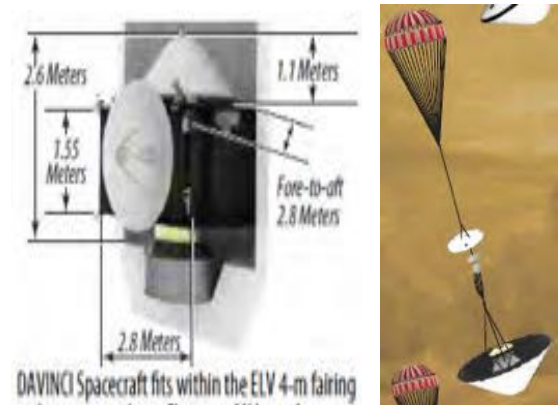
VERITAS: Venus Emissivity, Radio Science, InSAR, Topography, And Spectroscopy  
PI: Suzanne Smrekar, JPL  
**Deep-Space Optical Comm (DSOC)**



NEOCam:  
Near-Earth Object Camera  
PI: Amy Mainzer, JPL  
**Deep-Space Optical Comm (DSOC)**



Lucy: Surveying the Diversity of Trojan Asteroids  
PI: Harold Levison, Southwest Research Institute (SwRI)  
**Advanced Solar Arrays**



DAVINCI: Deep Atmosphere Venus Investigations of Noble gases, Chemistry, and Imaging  
PI: Lori Glaze, GSFC

# New Frontiers Program



# New Frontiers Program

1<sup>st</sup> NF mission  
New Horizons:

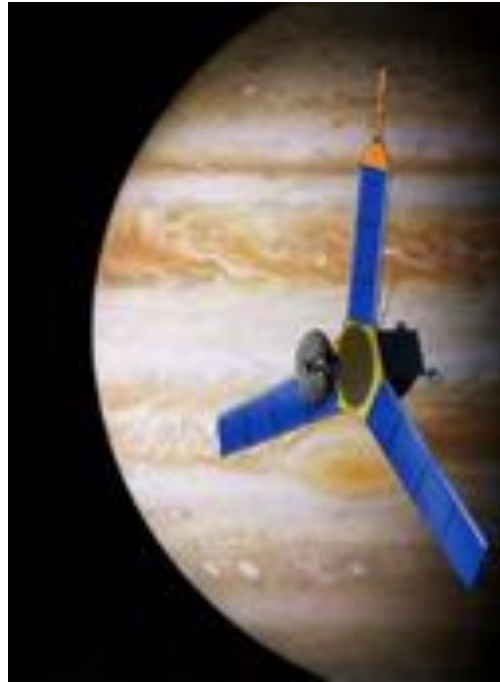
Pluto-Kuiper Belt



Launched January 2006  
Flyby July 14, 2015  
PI: Alan Stern (SwRI-CO)

2<sup>nd</sup> NF mission  
Juno:

Jupiter Polar Orbiter



Launched August 2011  
Arrives July 4, 2016  
PI: Scott Bolton (SwRI-TX)

3<sup>rd</sup> NF mission  
OSIRIS-REx:

Asteroid Sample Return

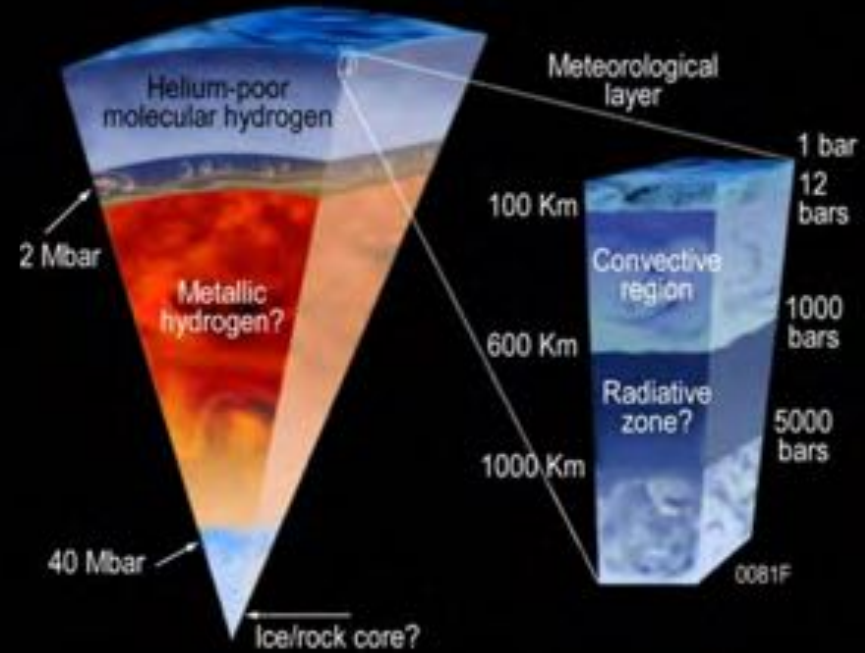


Launch window: Sept. 8,  
2016  
PI: Dante Lauretta (UA)

# Juno: Mission to the Planet Jupiter

## Science Objectives:

- Origin
- Interior Structure
- Atmosphere Composition & Dynamics
- Polar Magnetosphere



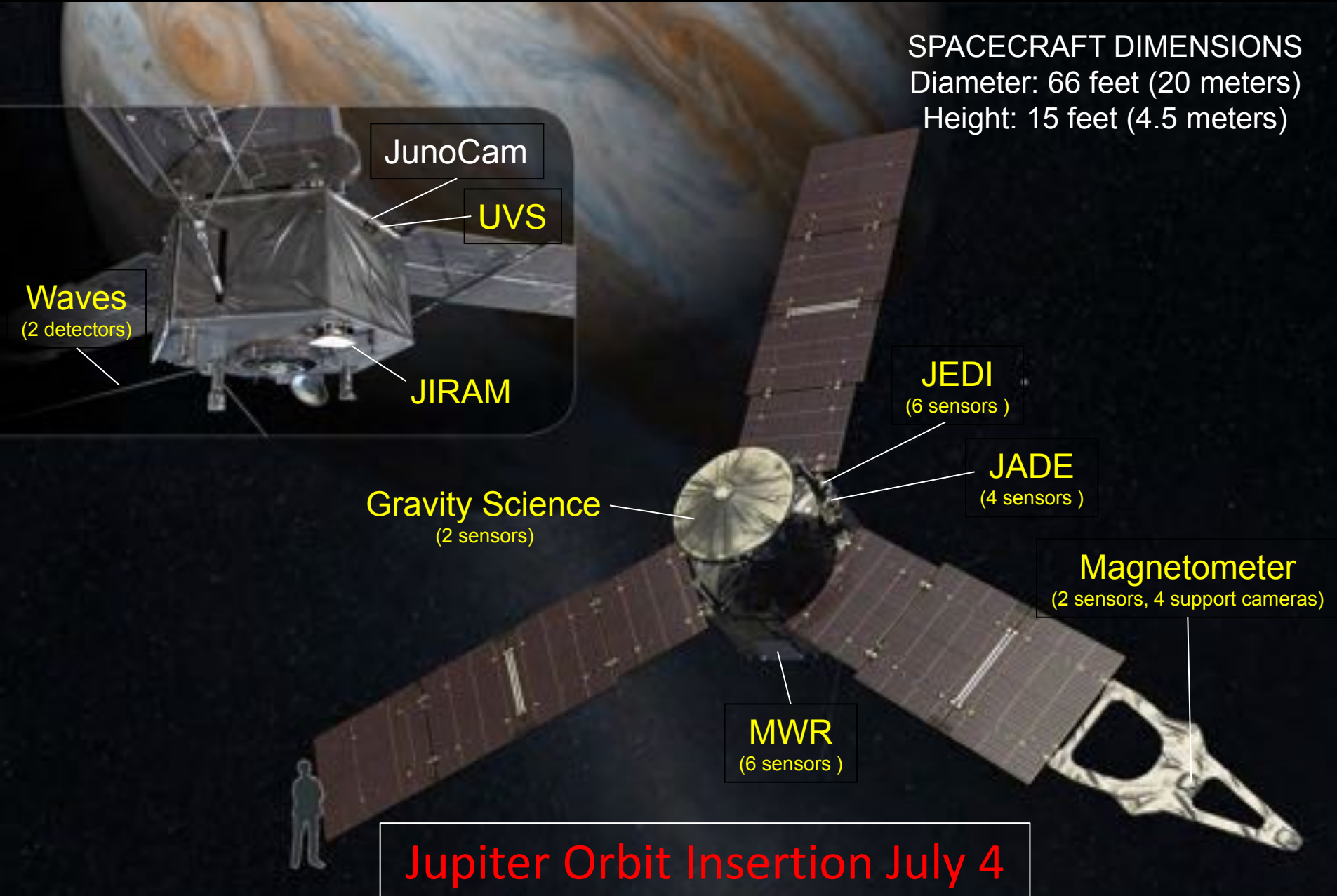


# Spacecraft and Payload

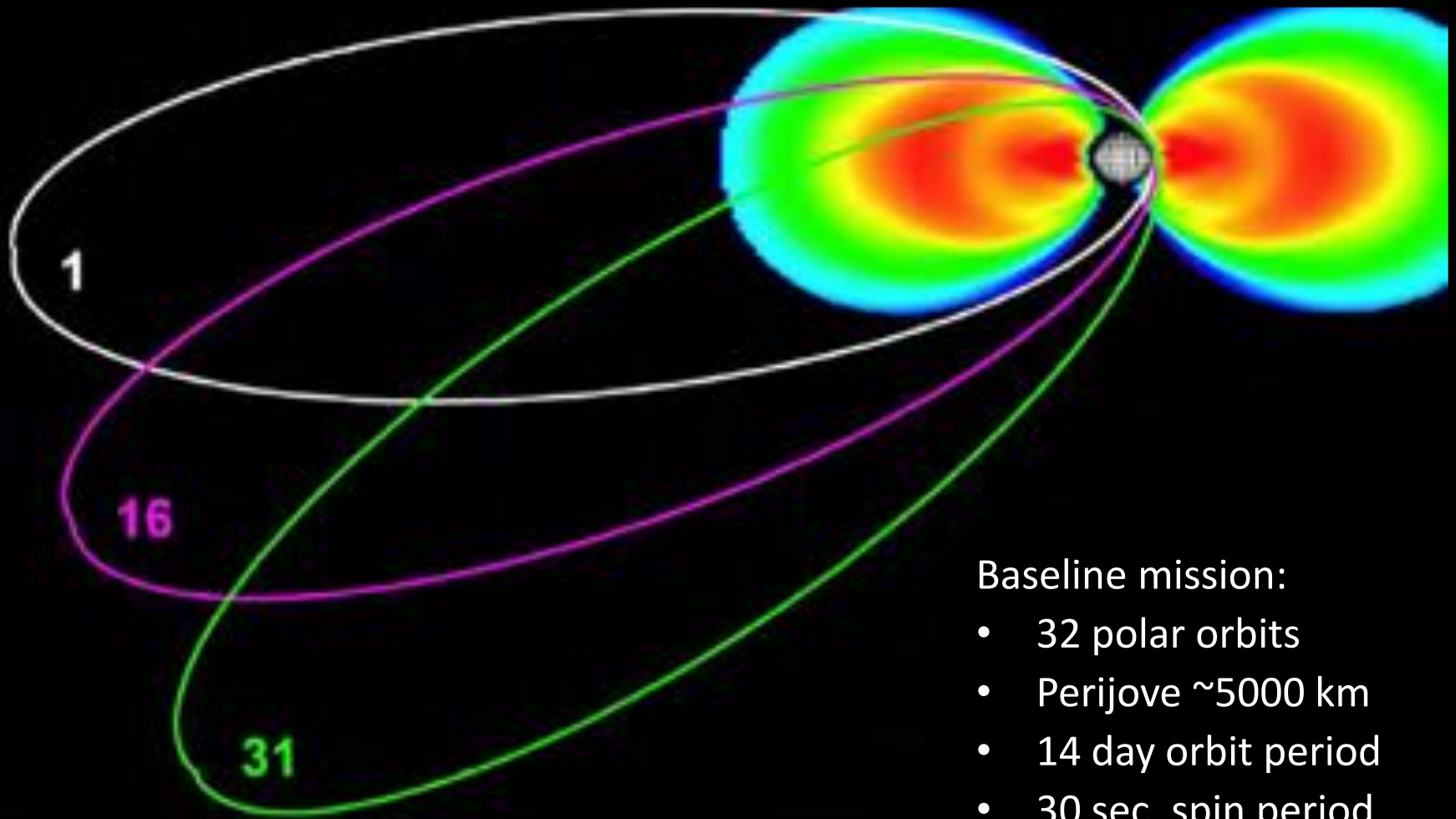
## SPACECRAFT DIMENSIONS

Diameter: 66 feet (20 meters)

Height: 15 feet (4.5 meters)



# Juno's Orbit



Baseline mission:

- 32 polar orbits
- Perijove ~5000 km
- 14 day orbit period
- 30 sec. spin period
- Solar-powered



## Jupiter Orbit Insertion

Jupiter Orbit Insertion, or JOI, will occur from July 1st 2016 and last after the insertion maneuver, or until July 31st, at 00:00 UTC (local time).

[Learn More](#)

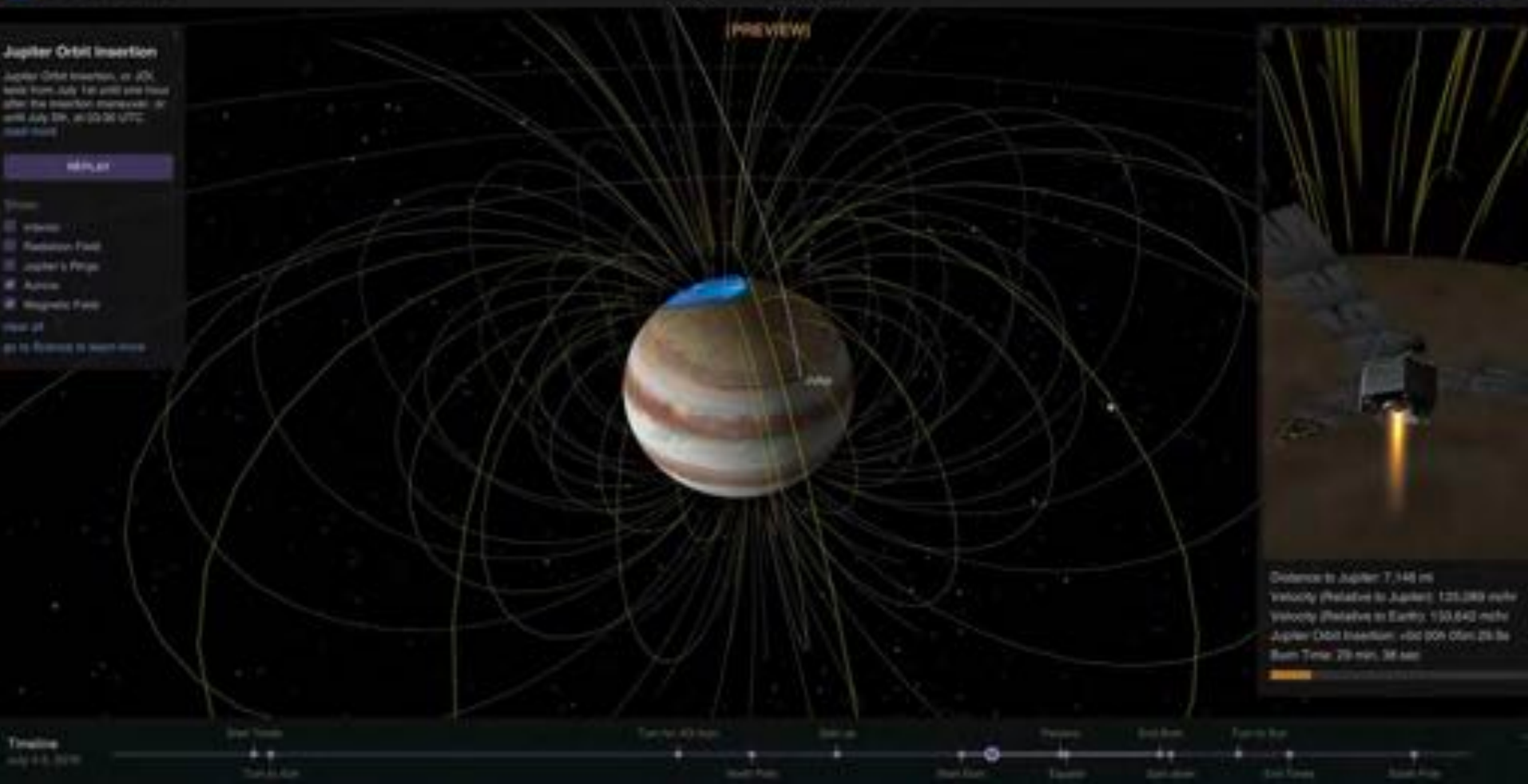
Show:

- ☐ Interiors
- ☐ Radiation Field
- ☐ Jupiter's Rings
- ☐ Auroras
- ☐ Magnetic Field

[View All](#)

[Go to Timeline to learn more](#)

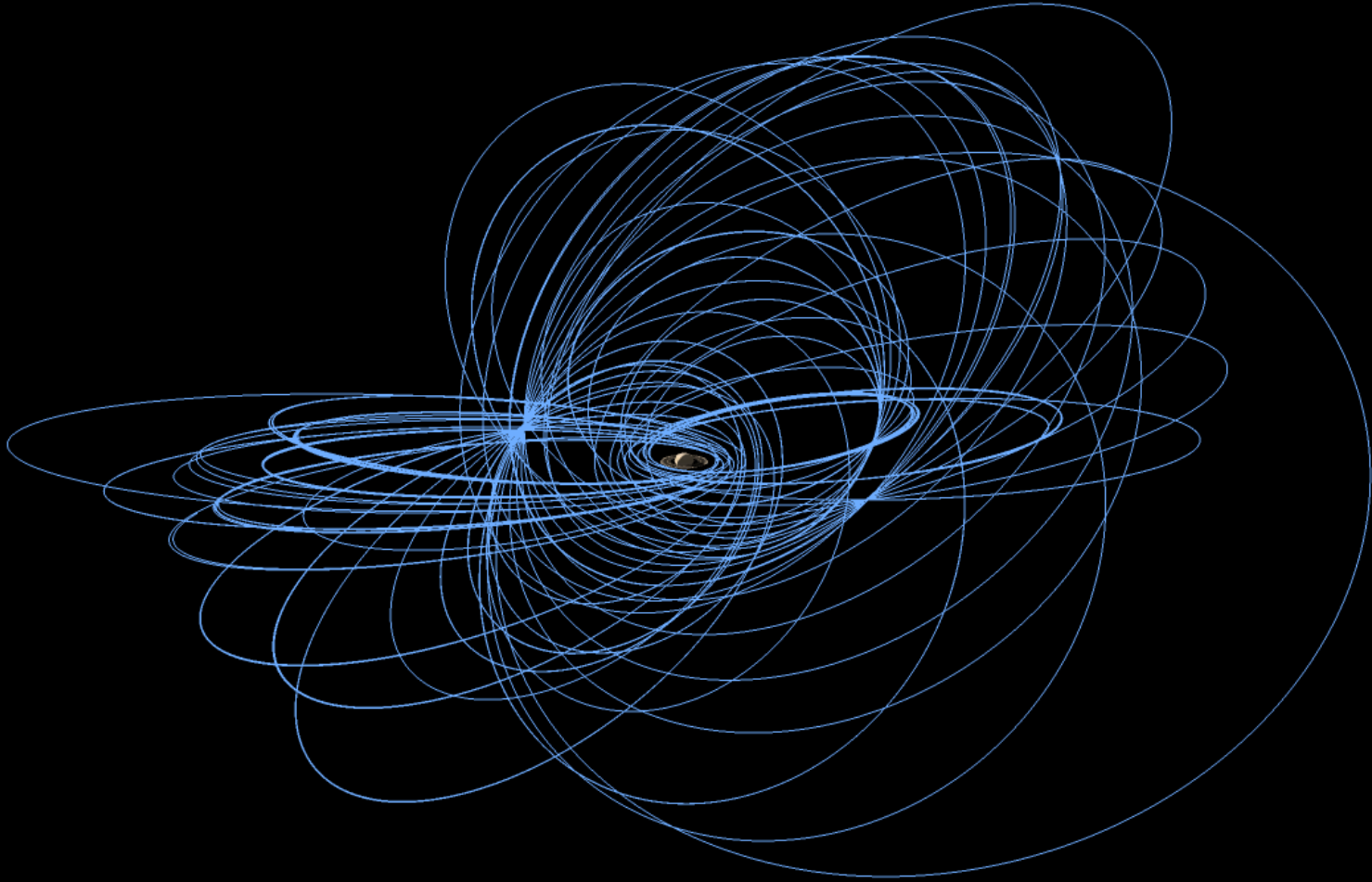
(PREVIEW)





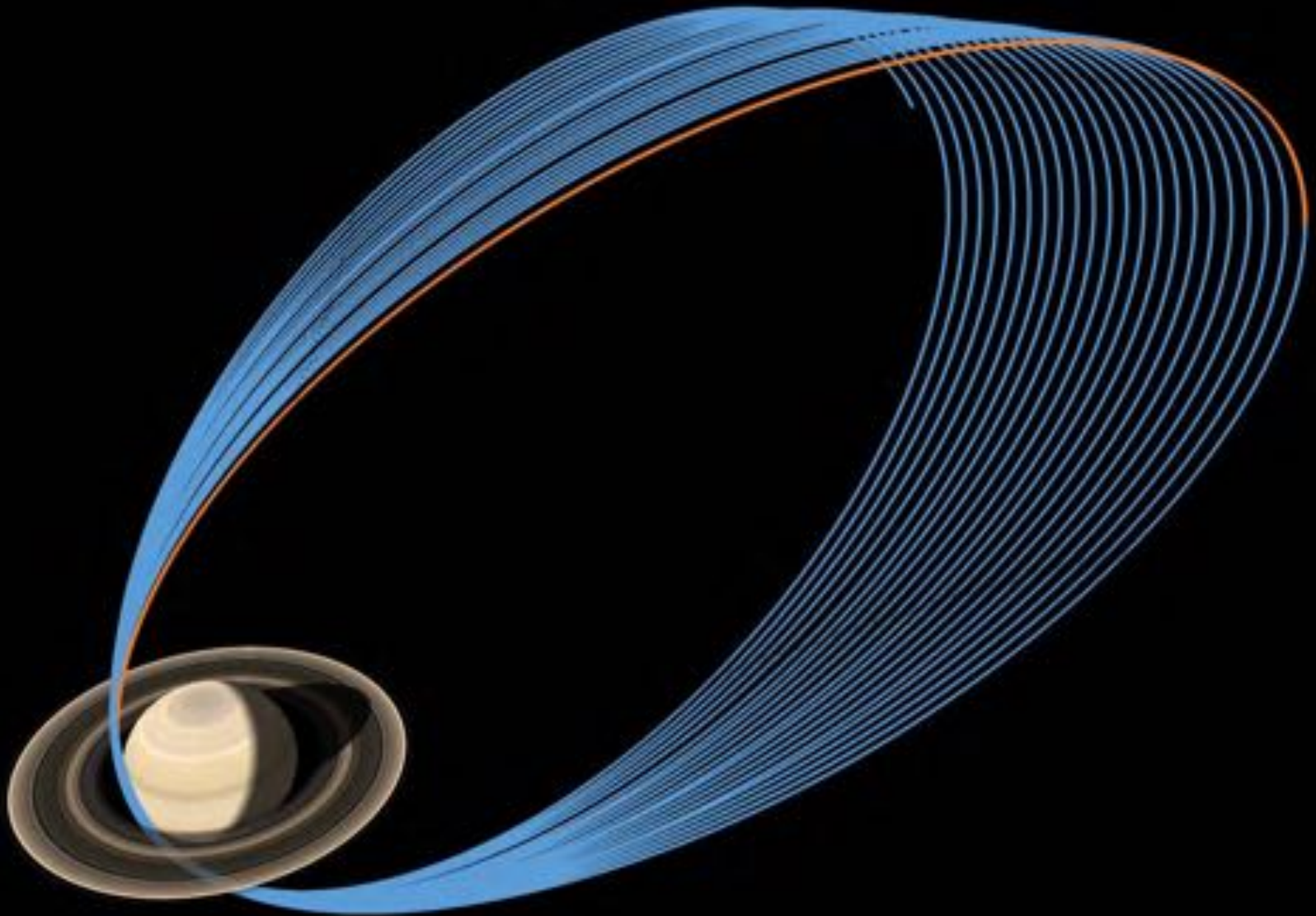


# Cassini's Orbits (2004-Present)



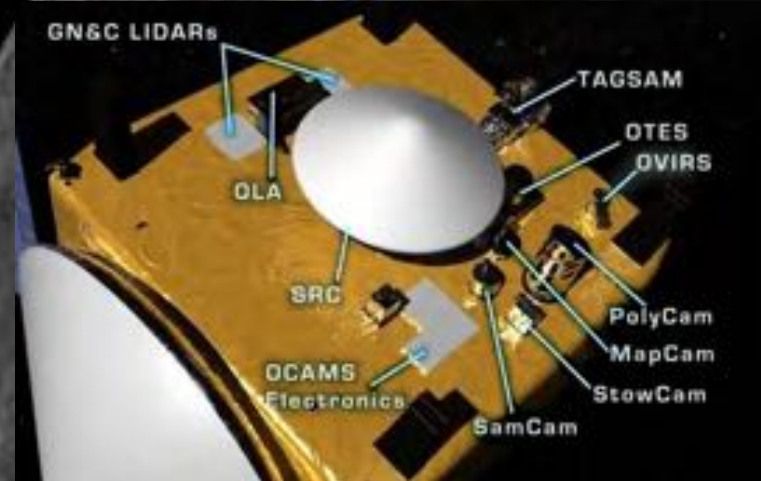
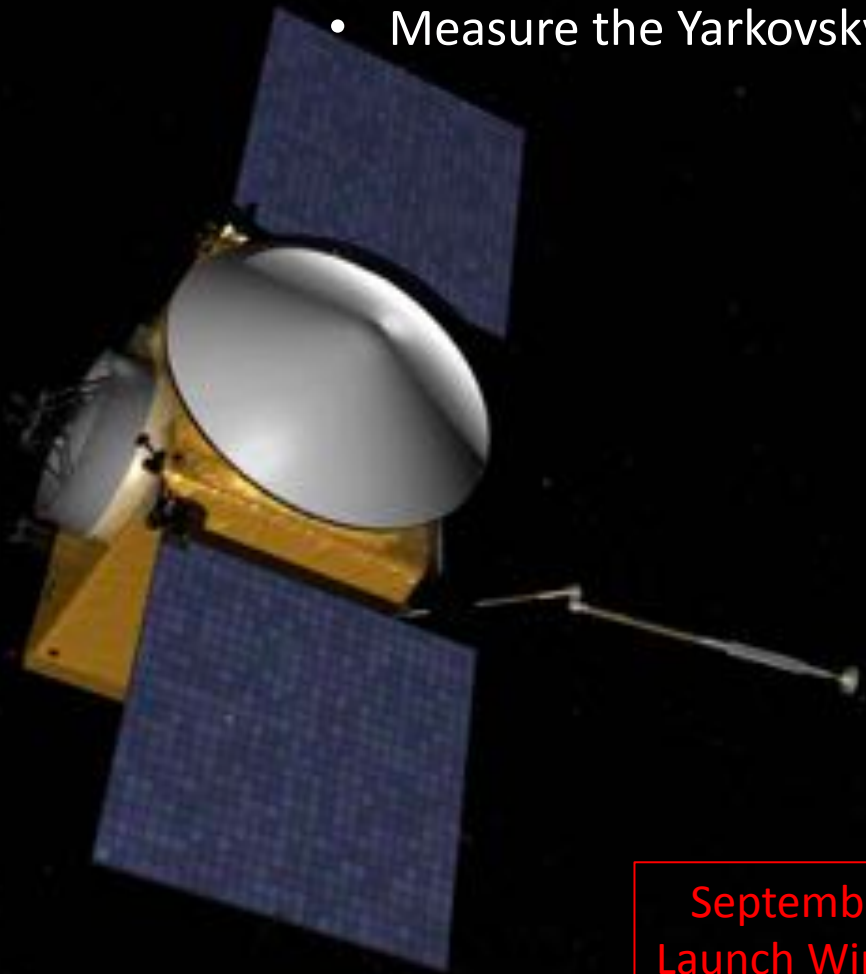


# Cassini Grand Finale Orbits



# OSIRIS-REx

- Return and analyze a sample of Bennu's surface
- Map the asteroid & document the sample site
- Measure the Yarkovsky effect



September 8, 2016  
Launch Window Opens



# OSIRIS-REx Arrives at KSC





# OSIRIS-REx Being Un-Boxed



# Next New Frontiers Program AO

- New Frontiers Program Community Announcements issued January 2016 and April 24, 2016
- Investigations are focused on the following mission themes (listed without priority):
  - Comet Surface Sample Return
  - Enceladus
  - Lunar South Pole-Aitken Basin Sample Return
  - Saturn Probe
  - Titan
  - Trojan Tour and Rendezvous
  - Venus In Situ Explorer
- Draft AO to be release this summer

# Next New Frontiers AO Time Frame

## Notional Schedule:

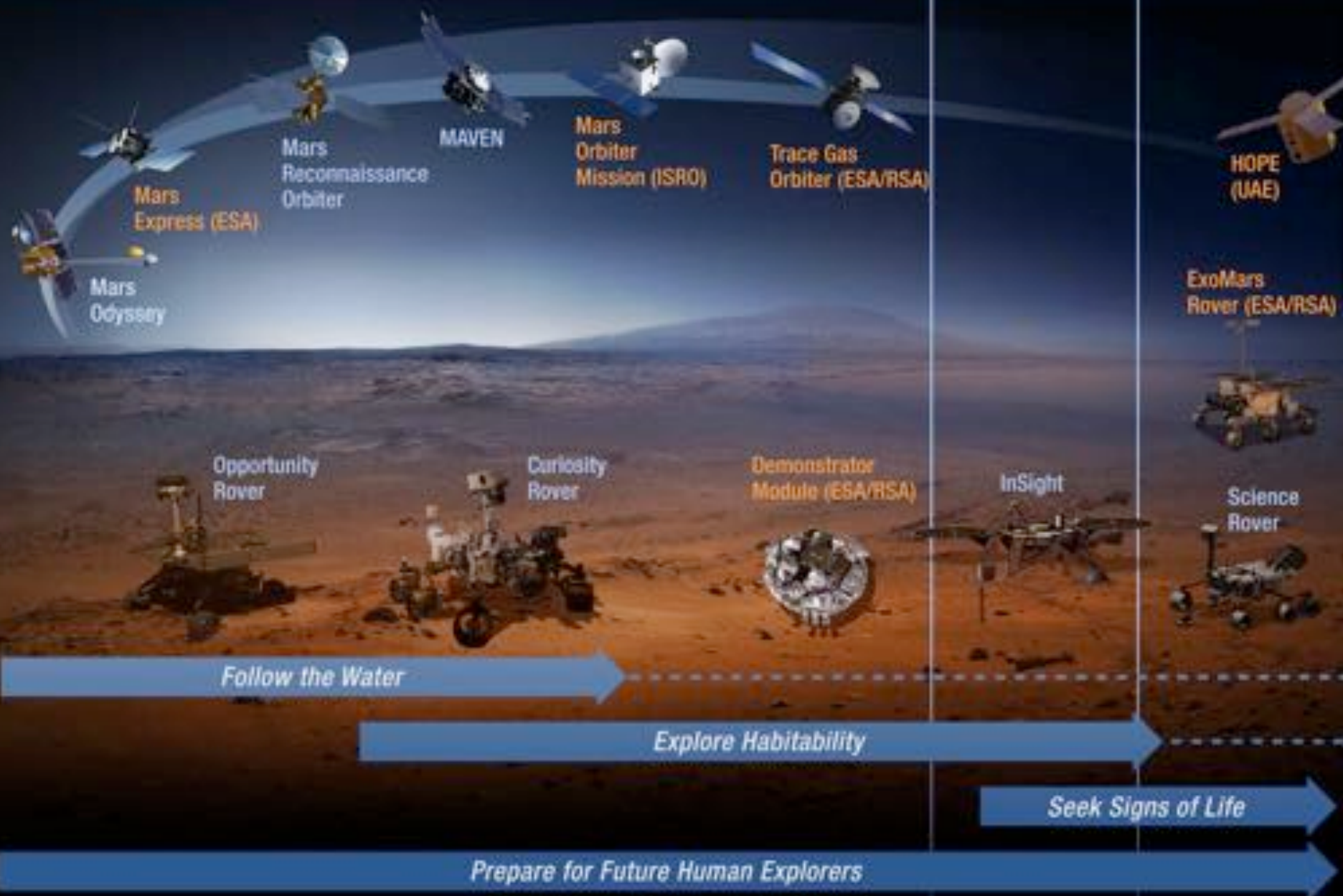
- Release of final AO..... January 2017 (target)
- Preproposal conference..... ~3 weeks after final AO release
- Proposals due ..... ~90 days after AO release
- Selection for competitive Phase A .... November 2017 (target)
- Concept study reports due..... October 2018 (target)
- Down-selection ..... May 2019 (target)
- KDP B ..... August 2019 (target)
- Launch readiness date ..... 2024

# Mars Exploration Program

Operational 2001–2016

2018

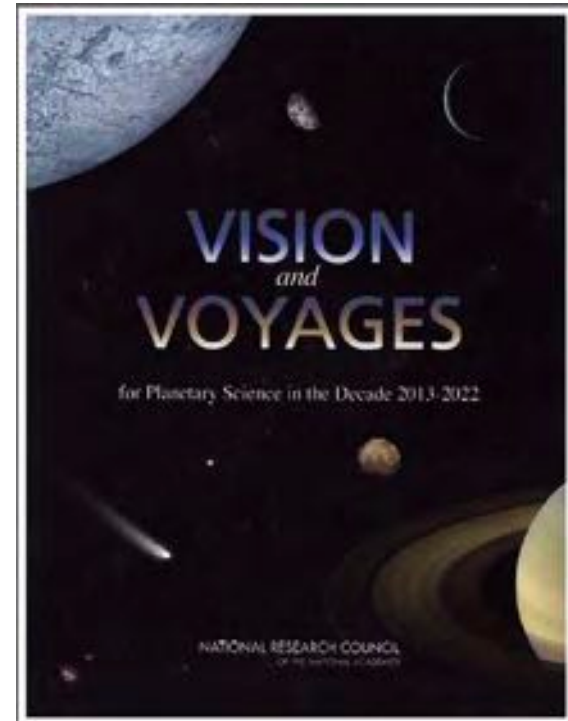
2020





# Timeline of NRC Studies

- 1<sup>st</sup> Planetary decadal: 2002-2012
- 2<sup>nd</sup> Planetary decadal: 2013-2022
- Extended Missions Review:
  - Tasked April 30, 2015
  - Report due to NASA September 2016
- R&A Restructuring Review:
  - Tasked August 13, 2015
  - Report due to NASA December 2016
- Large Strategic NASA Science Missions
  - Tasked March 2016
  - Report due to NASA August 2017
- Midterm evaluation:
  - To be tasked by September 2016
  - Extended Missions, R&A Restructuring & Large Strategic Missions will be input
  - Expect report due December 2017
- 3<sup>rd</sup> Planetary Decadal: 2023-2032
  - To be tasked *before* October 2019
  - Expect report to NASA due 1<sup>st</sup> quarter 2022



Questions?

