

National Aeronautics and
Space Administration



EXPLORE SCIENCE

LORI S. GLAZE

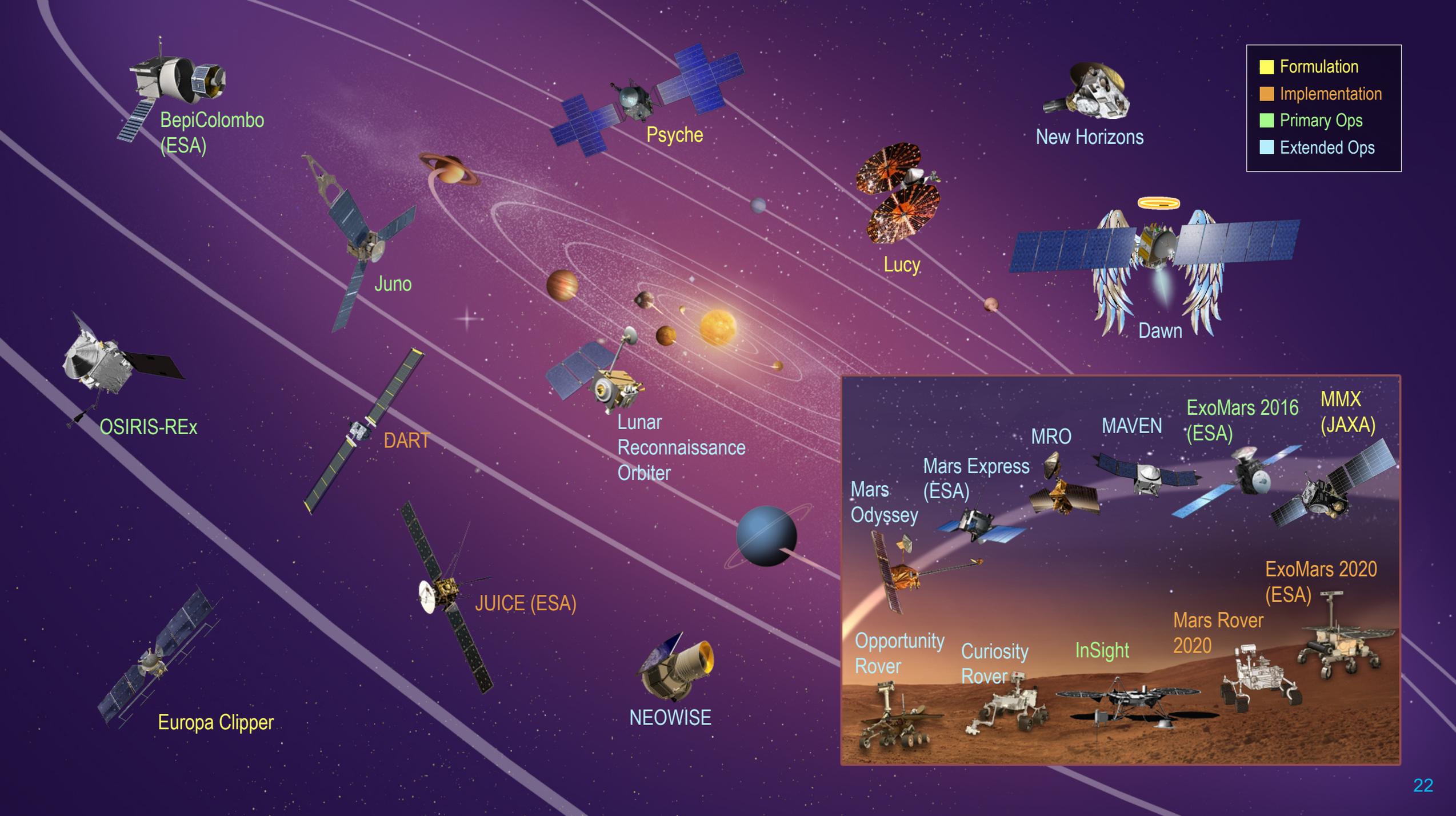
Planetary Division Director (Acting)

AGU - Planetary Science Division Status

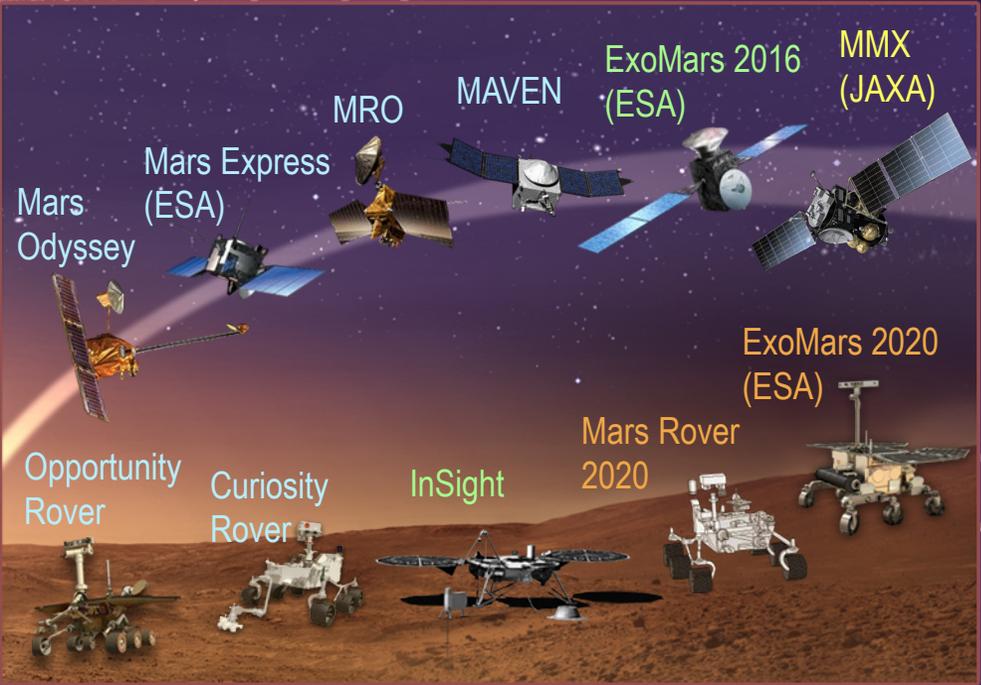
December 13, 2018

The background of the slide is a composite of two cosmic images. The top half features a dark blue and black space filled with numerous small stars and a prominent, bright blue nebula on the right side. The bottom half shows a similar starry field but with a warm, golden-yellow and greenish glow, suggesting a different nebula or a different spectral filter. The text 'Planetary Highlights' is centered in a white, sans-serif font across the middle of the image.

Planetary Highlights



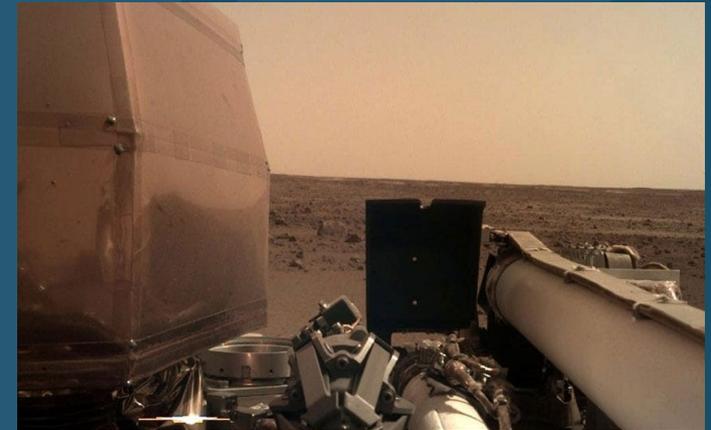
- Formulation
- Implementation
- Primary Ops
- Extended Ops





InSight

TAKING THE 'VITAL SIGNS' OF MARS

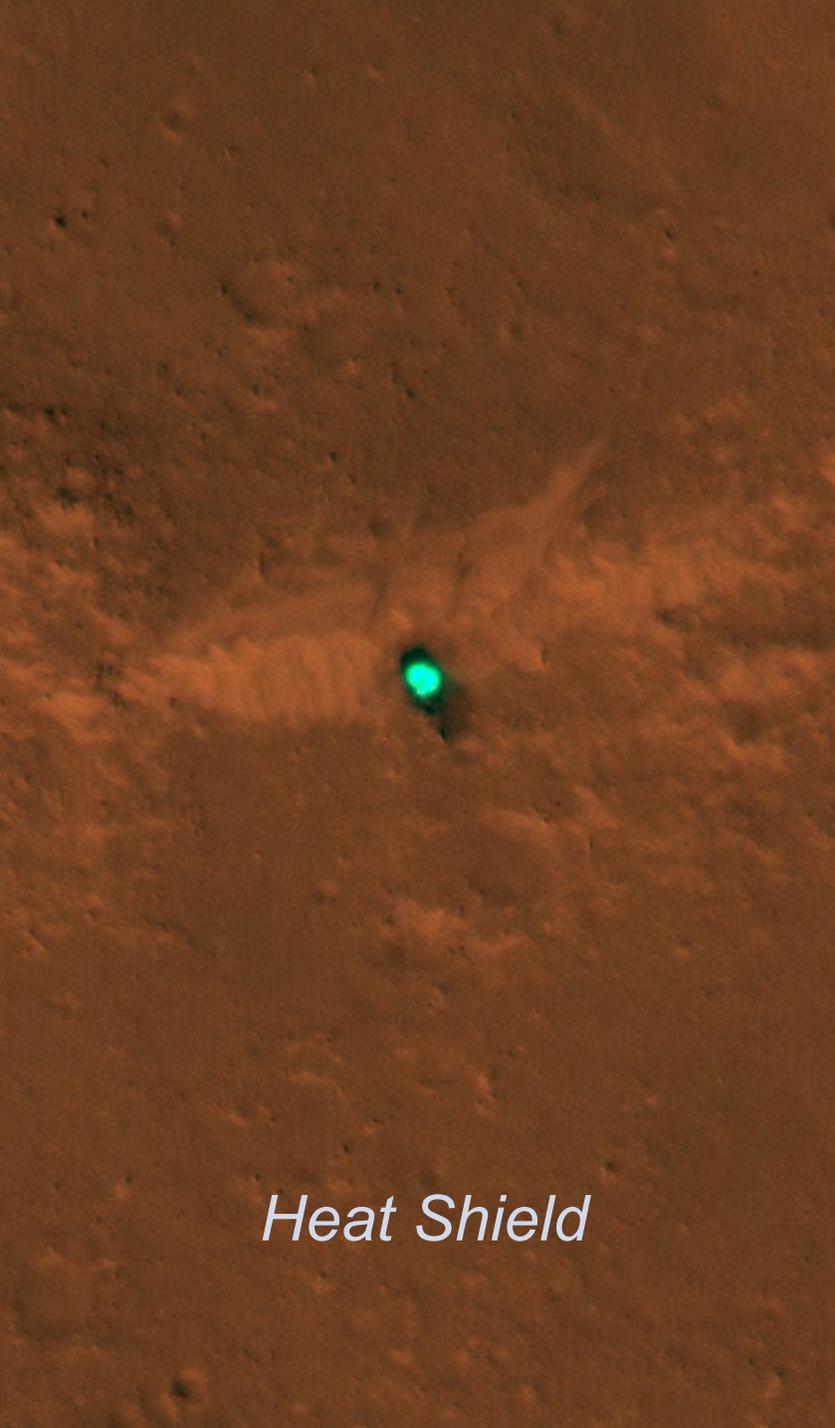


Nov. 26, 2018 - A view from NASA's InSight lander after it touched down on Mars' surface



Nov. 26, 2018 - MarCO-B image of Mars from about 4,700 miles (7,600 kilometers) away during its flyby

<https://astrobiology.nasa.gov/about/faq>



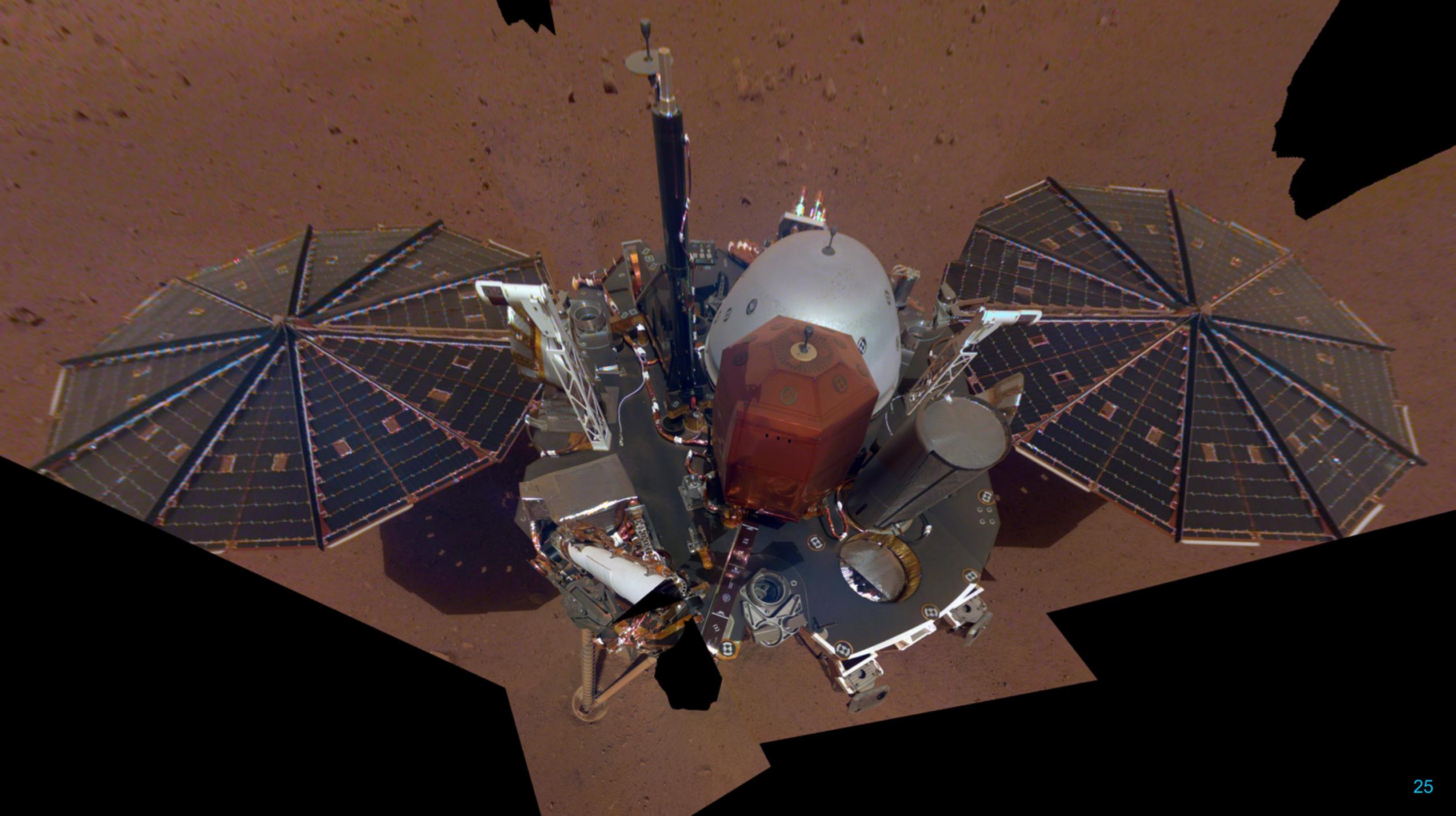
Heat Shield



InSight Lander



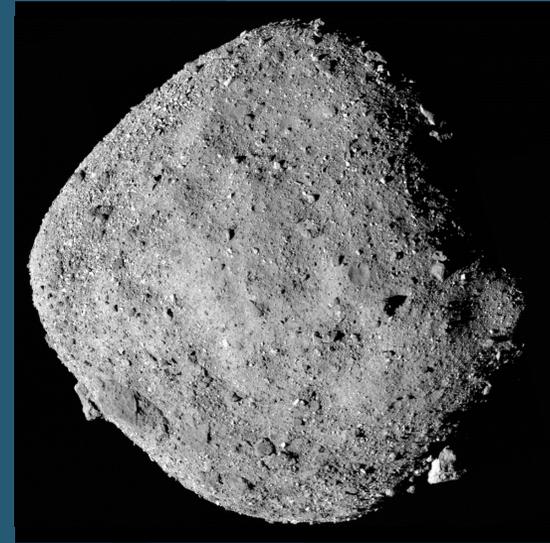
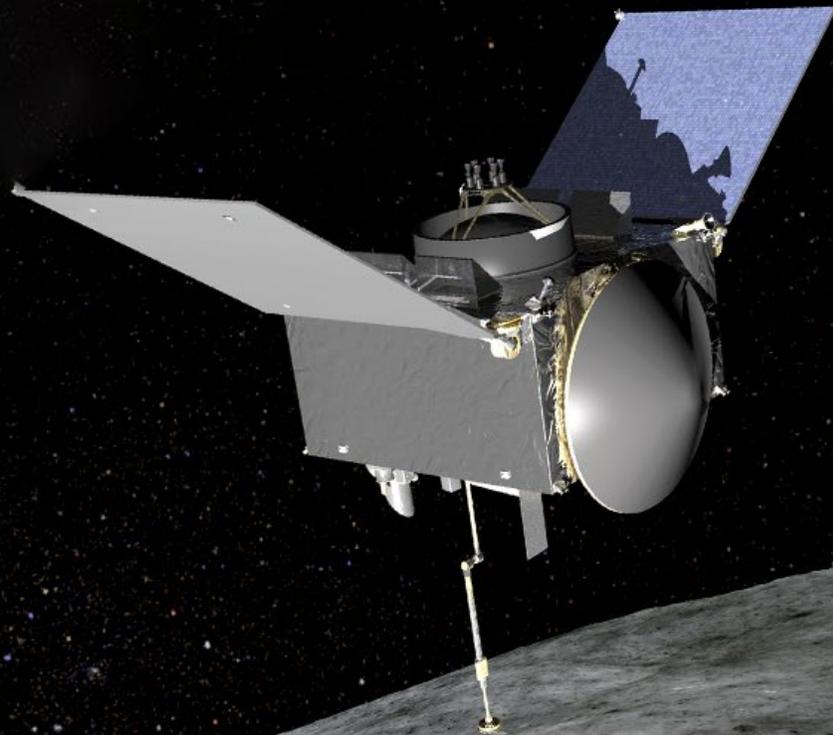
Backshell, Parachute



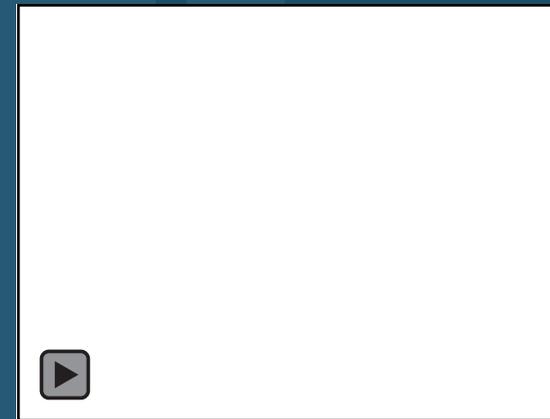
OSIRIS-REx

Bennu Arrival

December 3, 2018



Dec. 3, 2018 - Mosaic image of Bennu composed of 12 images collected by OSIRIS-REx from a range of 15 miles

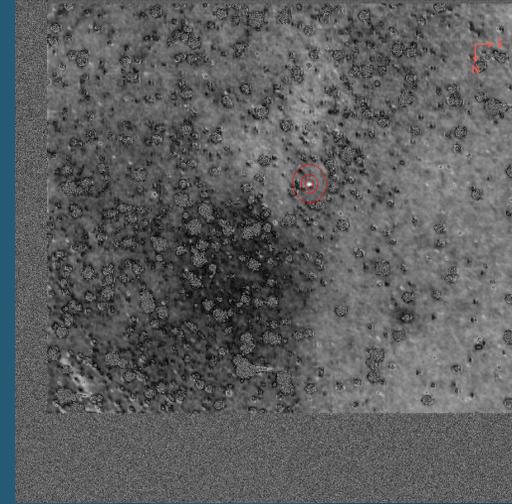


Oct. 2018 - 16 images showing the spacecraft's steady approach

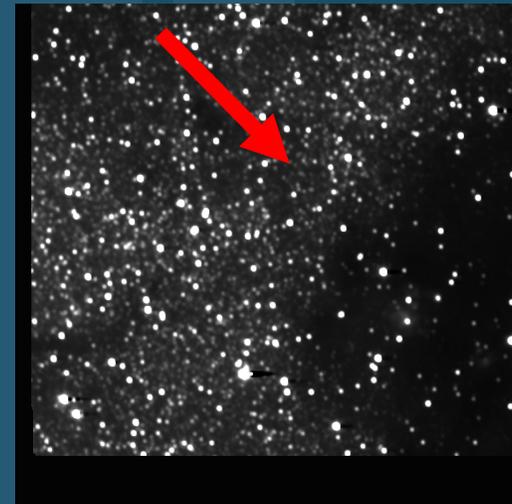
New Horizons

Arrival at Ultima Thule

January 1, 2019



Nov. 27, 2018 - LORRI image
without star field, UT in red circle



Nov. 27, 2018 - LORRI OPNAV
movie, Ultima Thule with star field

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Planetary Opportunities

Planetary Programs

DISCOVERY Long-Range Planning

- Cost Cap ~\$500M Phase A-D (FY19) excluding LV
- May propose the use of Radio-isotope Power Systems
- May include Radioisotope Heater Units

Release of draft AO December 12, 2018
 Release of final AO February 2019 (target)
 Pre-proposal..... ~3 weeks after final AO release
 Proposals 90 days after AO release
 Selection for competitive
 Phase A studies ~December 2019
 Concept study reports due November 2020 (target)
 Down-selection June 2021 (target)
 Launch readiness date Latter half of 2020's

NEW FRONTIERS 4 AO

 **CAESAR** Comet Astrobiology Exploration Sample Return

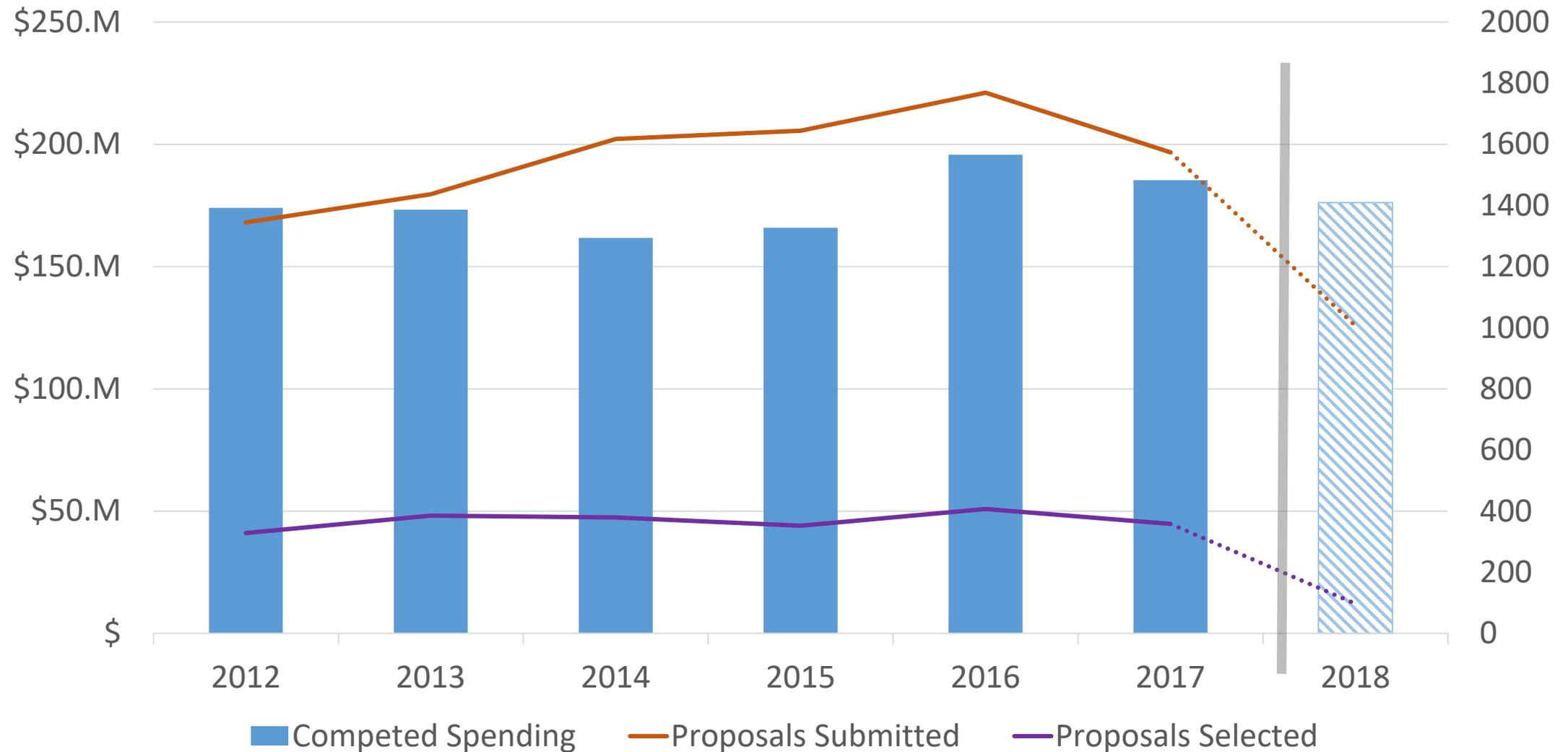
 **DRAGONFLY** A rotorcraft to explore prebiotic chemistry and habitability on the ocean world Titan

12 Proposals received on April 28, 2017
 Step-1 Selections Announced December 2017
Phase A Concept Study Reports due..... December 2018
 Down selection for Flight (target)..... July 2019
 Launch Readiness Date..... NLT December 31, 2025

Planetary Science Division - ROSES 18

Program Name	Step-1 Due Date	Step-2 Due Date	Panels Held	Selections/Proposals	Selection Dates
Exobiology (EXOB)	04/16/2018	05/24/2018	Yes	23/156	10/17
Exoplanets (XRP)	03/29/2018	05/30/2018	Yes	16/117	10/03
Emerging Worlds (EW)	04/12/2018	06/01/2018	Yes	26/110	10/18
Development & Advance of Lunar Instruments (DALI)	04/03/2018	06/05/2018	Yes	10/48	10/26
Solar System Obs. (SSO)	04/05/2018	06/07/2018	Yes	XX/66	TBD
MatISSE	04/18/2018	06/20/2018	Yes	6/56	11/09
Laboratory Analysis of Returned Sample (LARS)	05/24/2018	07/26/2018	Yes	XX/26	TBD
Planetary Data Archiving, Restoration, Tools (PDART)	05/10/2018	07/12/2018	Yes	XX/91	TBD
Cassini Data Analysis (CDAP)	06/01/2018	08/14/2018	Yes	XX/61	TBD
New Frontiers Data Analysis Program (NFDAP)	06/12/2018	08/23/2018	Yes	XX/25	TBD
Apollo Next Generation Sample Analysis (ANGSA)	06/22/2018	08/21/2018	Yes	XX/26	TBD
Planetary Major Equipment/Facilities (PMEF)	07/17/2018	09/17/2018	Yes	XX/11	TBD
Planetary Sci./Tech. Through Analog Research (PSTAR)	07/25/2018	Cancelled			
Mars Data Analysis (MDAP)	08/23/2018	10/25/2018	No	XX/104	TBD
Discovery Data Analysis (DDAP)	08/30/2018	11/01/2018	No	XX/22	TBD
Rosetta Data Analysis Program (RDAP)	08/30/2018	11/01/2018	No	XX/23	TBD
PICASSO	09/20/2018	11/20/2018	No	XX/91	TBD
Habitable Worlds (HW)	11/15/2018	01/17/2019	No		
Solar System Workings (SSW)	11/15/2018	01/31/2019	No		
Lunar Data Analysis (LDAP)	11/29/2018	02/28/2019			

Planetary Science ROSES R&A



Astrobiology Research Coordination Networks

NExSS

investigate the diversity of exoplanets and to learn how their history, geology, and climate interact to create the conditions for life

NfoLD

investigate life detection research, including biosignature creation and preservation, as well as related technology development

From Early Cells to Multicellularity

investigate the earliest biological processes and the evolution of life on Earth into more complex organisms up to the advent of multicellularity

Prebiotic Chemistry and Early Earth Environments

Investigate chemical processes under the conditions on the Early Earth and the formation of basic proto/biological molecules and pathways, leading to the emergence of systems harboring the potential for life

Ocean Worlds (Habitable Worlds)

investigate the diversity of other worlds in the solar system and to learn how their history, geology, and climate interact to create the conditions for life

Program Distribution

NExSS

AB Strategy: 1,4,5,6
R&A: ExoBio, SSO, HW, XRP,
LWS, ADAP, ATP, ESD

NfoLD

AB Strategy: 5
R&A: ExoBio, PSTAR,
PICASSO, MatISSE,
HW, ESD

From Early Cells to Multicellularity

AB Strategy: 2,3,4
R&A: ExoBio

Prebiotic Chemistry and Early Earth Environments

AB Strategy: 1,2,6
R&A: ExoBio, EW, SSO,
APRA, ESD

Ocean Worlds (Habitable Worlds)

AB Strategy: 1,4,5,6
R&A: ExoBio, SSW, CDAP,
HW, XRP, LWS, ESD

2015 Astrobiology Strategy Chapters

1. Identifying abiotic sources of organic compounds
2. Synthesis and function of macromolecules in the origin of life
3. Early life and increasing complexity
4. Co-evolution of life and the physical environment
5. Identifying, exploring, and characterizing environments for habitability and biosignatures
6. Constructing habitable worlds

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Looking Ahead

National Academies Reports

Midterm Evaluation (Aug. 2018)

- Discovery AOs at the Vision and Voyages recommended cadence of ≤ 24 months
- NF 5 AO as soon as possible, but at a minimum no later than 5 yrs after NF 4 AO
- Largely following or exceeding the Vision and Voyages recommended levels of R&A and technology spending
- NASA should sponsor 8 to 10 mission concept studies based on the list produced by the Committee on Astrobiology and Planetary Sciences

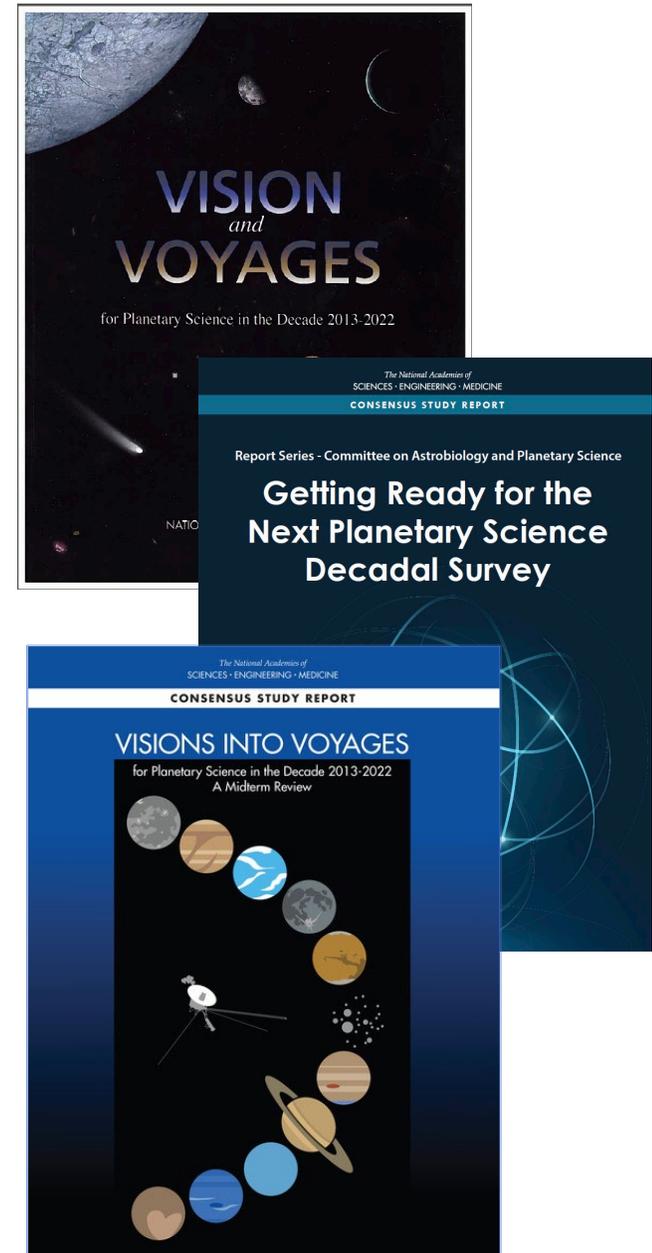
Exoplanet Science Strategy (Sept. 2018)

- NASA should support a cross-divisional exoplanet research coordination network that includes additional membership opportunities via dedicated proposal calls for interdisciplinary research

An Astrobiology Strategy for the Search for Life in the Universe (Oct. 2018)

- NASA's programs and missions should reflect a dedicated focus on research and exploration of subsurface habitability
- NASA should accelerate the development and validation in relevant environments, of mission-ready, life detection technologies
- NASA should integrate astrobiological expertise in all mission stages

Sample Analysis Investment Strategy (Briefing imminent)



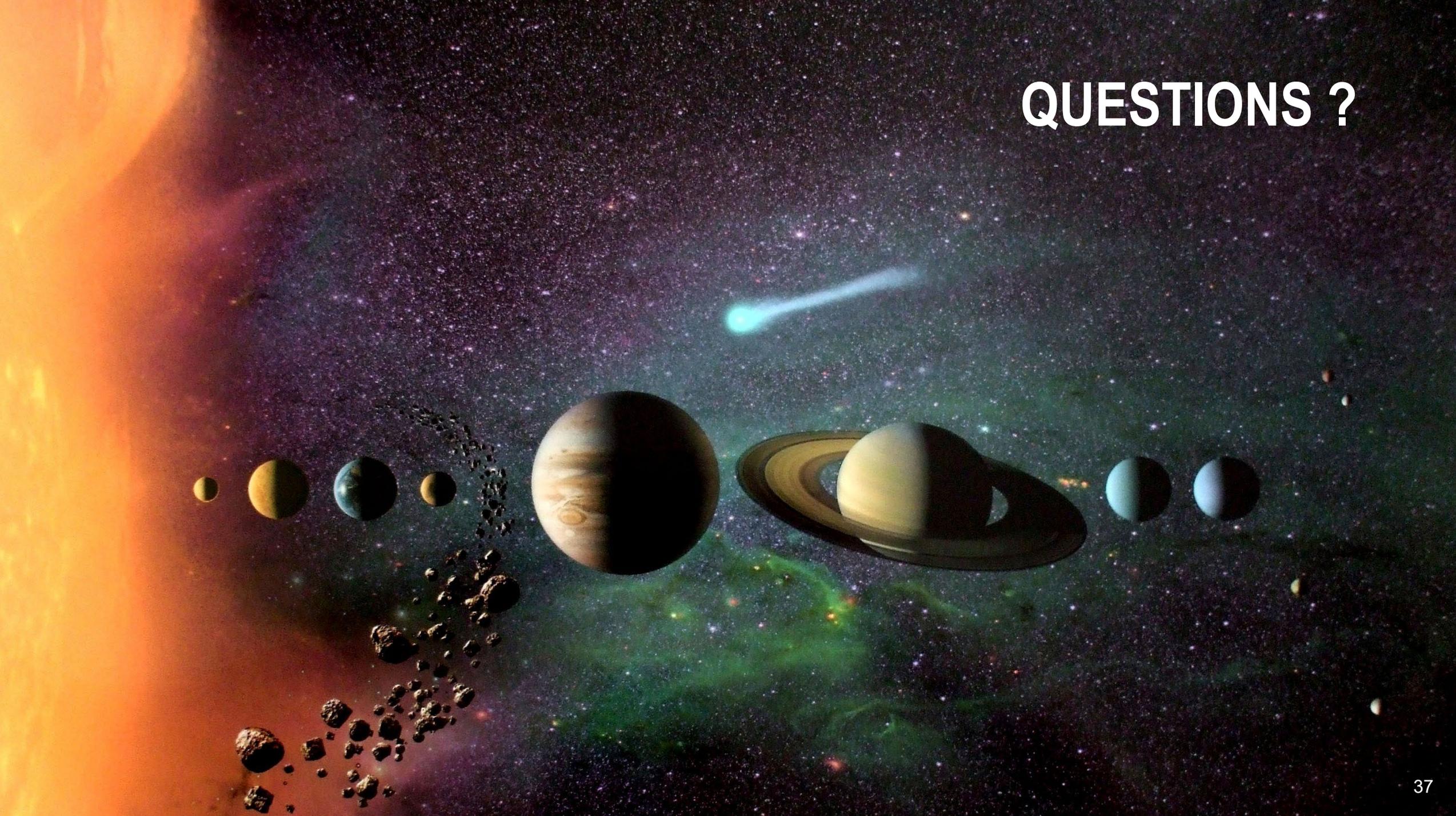


Plan for Conducting Pre-Decadal Mission Concept Studies

Competed ROSES opportunity for science teams to conduct remaining studies

- Approximately 6 months per study duration with studies staggered over a year
- Support for face-to-face meetings and engineering runs
- Requirement for community updates at Analysis Group meetings and/or town halls as well as at a final Findings Workshop
- Final reports, including advocacy cost estimates, to be provided to the Decadal Survey as input

QUESTIONS ?



Recent NAS reports

Exoplanet Science Strategy (Sept. 2018)

- Finding: The search for life outside the Solar System is a fundamentally interdisciplinary endeavor. The Nexus for Exoplanet Systems Science (NExSS) research coordination network encourages the cross-disciplinary and cross-divisional collaborations needed to support NASA exoplanet research and missions.
- Recommendation: Building on the NExSS model, NASA should support a cross-divisional exoplanet research coordination network that includes additional membership opportunities via dedicated proposal calls for interdisciplinary research.

An Astrobiology Strategy for the Search for Life in the Universe (Oct. 2018)

- Finding: Cross-divisional collaborations promoted by NASA's Astrobiology Program between Earth science, astronomy, heliophysics, and planetary science have begun the task of breaking down disciplinary entrenchments and are helping the astrobiology and exoplanet communities reach their full potential
- Recommendation: NASA's programs and missions should reflect a dedicated focus on research and exploration of subsurface habitability in light of recent advances demonstrating the breadth and diversity of life in Earth's subsurface, the history and nature of subsurface fluids on Mars, and potential habitats for life on ocean worlds.
- Recommendation: To advance the search for life in the universe, NASA should accelerate the development and validation in relevant environments, of mission-ready, life detection technologies. In addition, it should integrate astrobiological expertise in all mission stages—from inception and conceptualization, to planning, to development, and to operations.