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# Outer Planets and Ocean Worlds Program Status

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OPAG Meeting

August 11, 2016



# The Big Picture

- We are in a time of both tremendous opportunity and real progress for the Outer Solar System and Ocean Worlds.
  - Europa Clipper is proceeding toward KDP B.
  - Juno is about to begin its science mission.
  - New Horizons completes its downlink and begins its extended mission this year.
  - Meaningful investment in Ocean Worlds has begun.
  - Expansion of NF4 to include Ocean Worlds.
  - Decadal Survey preparations underway well ahead of time.
- These are all positive actions to combat the coming radio silence for the outer solar system.
- All of these topics will be covered in detail at this meeting.

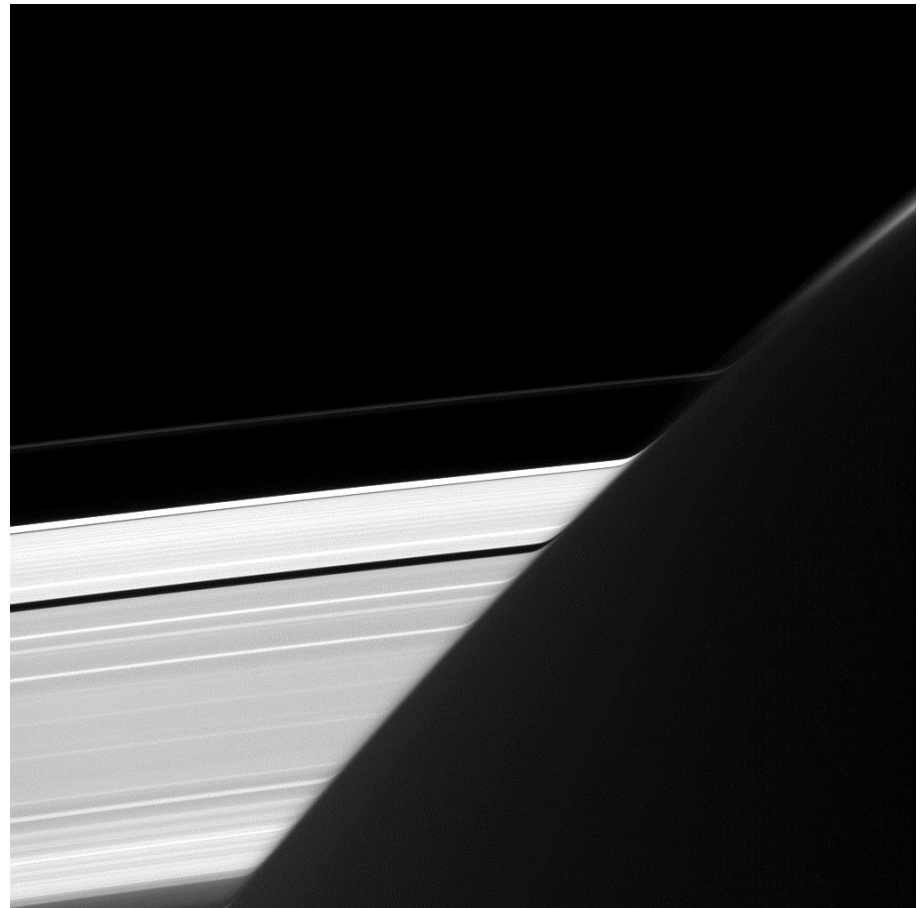


# Mission Status – Cassini and JUICE



- **Cassini** health continues to be excellent.
- Continuing Titan flybys to line up for the start of high inclination F ring orbits in November.
- Grand Finale follows in April, diving between the rings and the planet, with mission ending September 15, 2017.

- **JUICE** instruments from NASA going through PDR as we near Phase C.





# Europa Clipper

- Appropriation supports project development to launch in 2022.
  - Europa funded at \$175M for “orbiter with a lander to meet the science goals for the Jupiter Europa mission...use the SLS as the LV...plan for a launch NLT 2022...and include in the FY17 budget the five year funding profile necessary to achieve these goals.”
- Accommodation of all instruments is now complete!
- Completed studies of a variety of optional enhancements to the Clipper mission:
  - Deployed probes to study the surface and plumes
  - Additional laser altimeter on payload
  - Enhancements to radio/geophysical science
  - Enhancements to selected payload to “climb” the Ladder of Life
- NASA decided not to pursue any of these add-ons since the science value was not commensurate with the added impact.



# Europa Lander

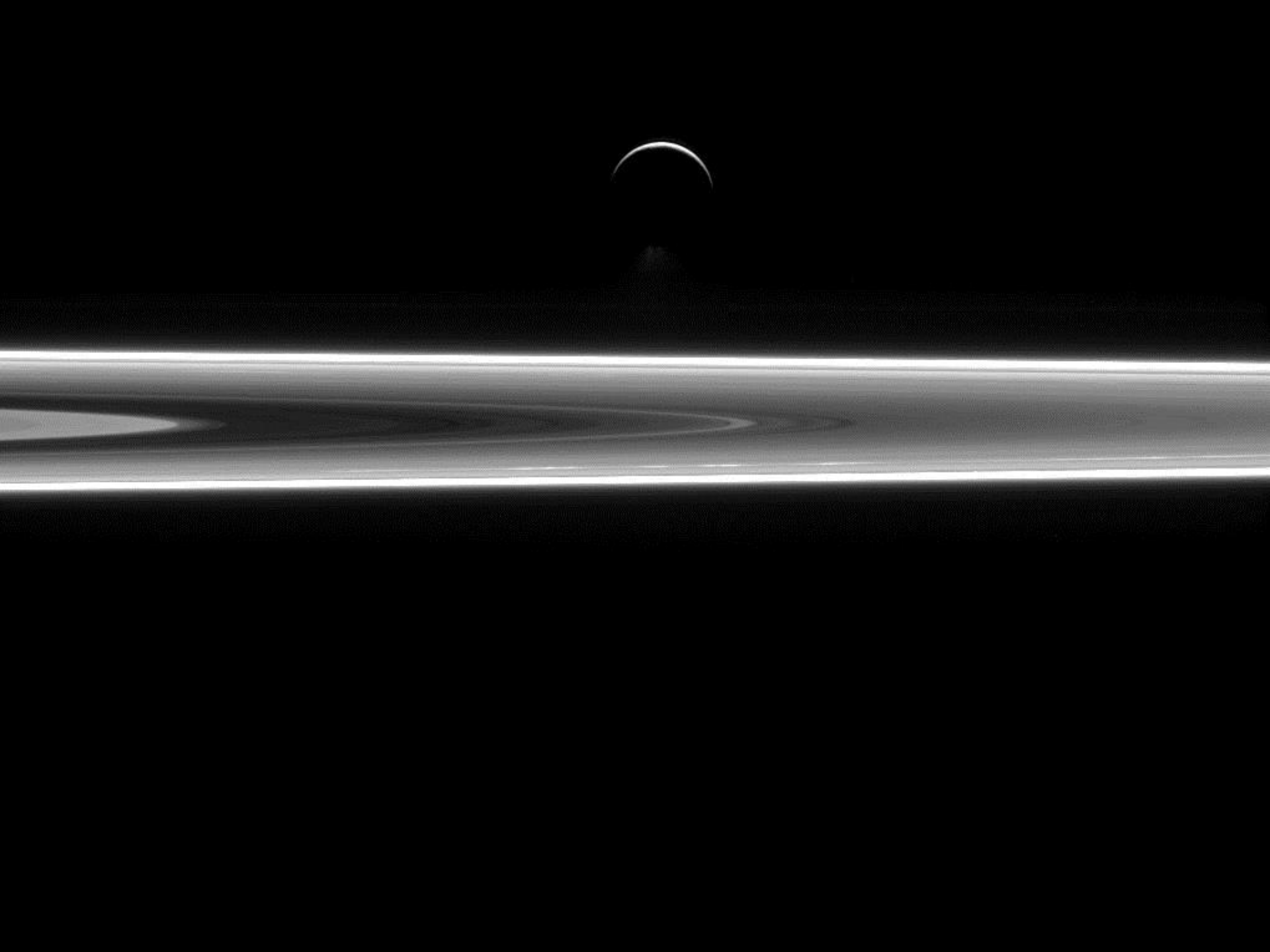
- NASA has been provided funding and direction to perform a pre-Phase A mission study of a Europa Lander concept. Study is being conducted by the Clipper team (JPL/APL).
- Primary purpose of this lander is to search for evidence of biomarkers and/or life.
- SDT put in place in June and is working diligently to define the science content of the concept.

We very much welcome OPAG's critical assessment of the lander science definition



# Ocean Worlds

- A variety of efforts have begun to support the creation of an Ocean Worlds effort.
- OPAG ROW Working Group is identifying and prioritizing science objectives for Ocean Worlds
  - Fills a critical need to define a compelling framework that can be considered by the next Decadal Survey and integrated into the planetary portfolio.
- Meetings being held to cross fertilize across disciplines
  - Second Ocean Worlds Meeting to foster cooperation between the oceanographic and planetary science communities for the exploration of ocean worlds
  - Biosignatures of Extant Life on Ocean Worlds Workshop at GSFC
  - NRC activities
- COLDTech ROSES program supports the development of spacecraft-based instruments and technology for surface and subsurface exploration of ocean worlds such as Europa, Enceladus, and Titan







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# New Frontiers Program Status

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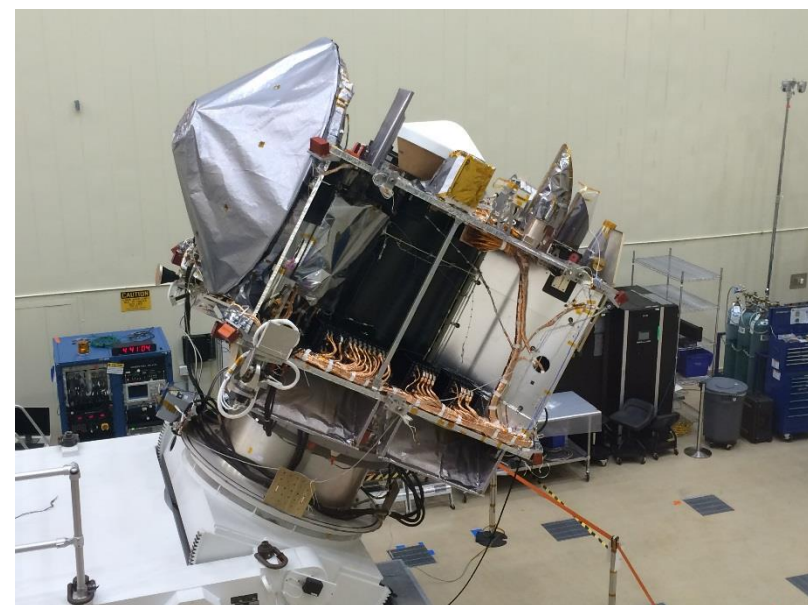
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# New Frontiers Mission Status



**OSIRIS-Rex – Shipped to KSC for launch in September!**



**Juno – Now in Jupiter orbit!**



**New Horizons – Data downlink nearing completion, extended mission approved!**



# New Frontiers 4 AO - Parameters

- The 4<sup>th</sup> New Frontiers AO (NF4) is scheduled for release in January 2017.
- A community announcement with key parameters was issued in January 2016.
- Some key elements from that announcement:
  - PI-Managed Mission Cost (PMMC) cap of \$850M (FY15\$) for phases A-D,
  - Foreign contributions may not exceed one-third of the PMMC, and the value of foreign contributions to the science payload may not exceed one-third of the total payload cost,
  - MMRTGs and RHUs are available and paid for under the PMMC,
  - Some technologies will be incentivized, and
  - Launch readiness date of 2024 (2025 if nuclear).
- NASA has not approved the issuance of the New Frontiers AO and this notification does not obligate NASA to issue the AO and solicit proposals.



# New Frontiers 4 AO – Mission Themes

- Investigations proposed to the NF4 AO are limited to the following unprioritized mission themes
  - Comet Surface Sample Return,
  - Lunar South Pole-Aitken Basin Sample Return,
  - Ocean Worlds (Titan and/or Enceladus),
  - Saturn Probe,
  - Trojan Tour and Rendezvous, and
  - Venus In Situ Explorer.
- Ocean Worlds theme is focused on the search for signs of extant life and/or characterizing the potential habitability of Titan and/or Enceladus.
  - Note the updated usage of “and/or” to address confusion.
- The draft AO will fully elucidate information on the mission themes, including science objectives.



# New Frontiers 4 AO - Schedule

- July 2016: Draft AO targeted for release
  - *Comments for NASA's consideration are encouraged on this draft AO* as the final AO is prepared in Fall 2016.
- January 2017: Final AO targeted for release with proposals due 90 days later
- November 2017: Selection for competitive Phase A studies
- October 2018: Concept study reports due
- May 2019: Announcement of flight selection
- ***All dates are targets, not guarantees.***



# Items of Note in the Draft AO

- Some items were deferred to Step 2 in an effort to reduce workload on proposers (e.g., SEOs, TDOs, Student Collaborations, Communications Plan).
- Increased discussion of traceability of proposed science objectives to the Decadal Survey is required (Requirement 2).
- Technology incentives of \$10M for NEXT and \$20M for HEEET.
- Additional guidance provided on defining a threshold mission.
- A Deputy PI is required.
- Phase A studies budgeted at \$4M (RY\$)
- Medium performance LV is provided; increase in performance or size of LV is funded by PMCC.
- Expectations for level of detail in schedule are reduced.
- Heritage appendix limited to 30 pages.
- Clarification provided on Data Analysis Plan (Requirement B-16) and Data Archiving Plan (Requirement B-23)





# Questions?

