

SCIENCE

# Outer Planets and Ocean Worlds Program Status

Curt Niebur

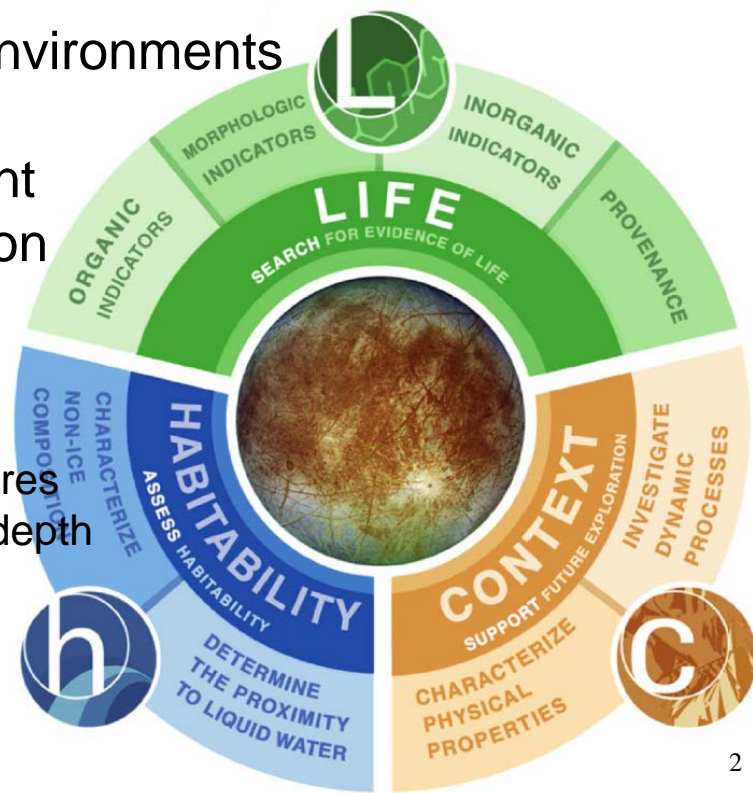
Lead Program Scientist, NASA Headquarters

OPAG Meeting

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# Europa Lander SDT Report

- The Science Definition Team submitted its report in early February listing three prioritized goals:
  1. Search for Evidence of Life on Europa
  2. Assess the habitability of Europa via in situ techniques uniquely available to a lander mission
  3. Characterize surface and subsurface properties at the scale of the lander to support future exploration
- SDT used extreme, limited nutrient Earth environments as analogues
- SDT philosophy that no single measurement provides sufficient evidence for the detection of life means multiple lines of evidence are needed
  - Three instruments use different measurement techniques to search for nine unique biosignatures
  - Mission collects at least 5 samples from 10 cm depth
- SDT presented a decision framework for life detection to assess how results should be interpreted in the search for life





# Life Detection



- Credibly achieving the primary goal (search for evidence of biomarkers and/or signs of extant life) requires broad consensus on the definition of:
  - The type of evidence that would be indicative of life;
  - The appropriate measurement and sampling techniques used to look for that evidence; and
  - The instruments used to take those measurements and samples.
- The Astrobiology community has been discussing these topics and NASA has been investing in technology development for over a decade.
- NASA has accelerated discourse and investment in this area, including:
  - COLDTech program and refocusing of Picasso and Matisse programs;
  - Discussions with STMD on Centennial Challenge focused on life detectors (RFI released in December 2017);
  - Series of workshops:
    - Technical Workshop on the Potential for Finding Life in a Europa Plume (NASA, 2015)
    - Biosignature Preservation and Detection in Mars Analog Environments (NASA, May 2016)
    - Probabilistic frameworks for recognizing complex molecules as biosignatures (NASA, September 2016)
    - Biosignatures of Extant Life on Ocean Worlds Workshop (NASA, September 2016)
  - A Workshop on Searching for Life Across Space and Time (NRC SSB, December 2016)
- It is important to establish a broad community consensus on a practical framework to guide mission and payload design.



# Community Input on SDT Report



- Given the challenging goal of the lander mission, NASA and the SDT are eager to hear feedback from the science community on the science content and science implementation for the mission concept.
- NASA will host interactive town hall meetings at the primary conferences for the planetary science and astrobiology communities (LPSC 3/19 and AbSciCon 4/23) to provide an extended opportunity to communicate the science content of the report and, equally importantly, to engage in constructive discussion with the scientific community.
- An executive board will collect findings from these town halls and present them to NASA for consideration prior to the Mission Concept Review.



# Europa Multiple Flyby Mission

- EMFM recently received Agency approval to proceed into Phase B!
  - Instrument PDRs begin late this summer
- But we have challenges to face
  - SRB report was positive but provided some issues that need attention
  - Resources available (mass, power, etc.) are limited and must be carefully managed and tracked
- Project has designed a mission that can accomplish the science within the estimated budget and schedule, and well within the KDP-A cost range
- PSD intends to aggressively manage the mission and stay within budget, including accepting reduced science if necessary
- The goal is to provide the flexibility to PIs to solve problems at the local level, seeking project then program assistance only when needed

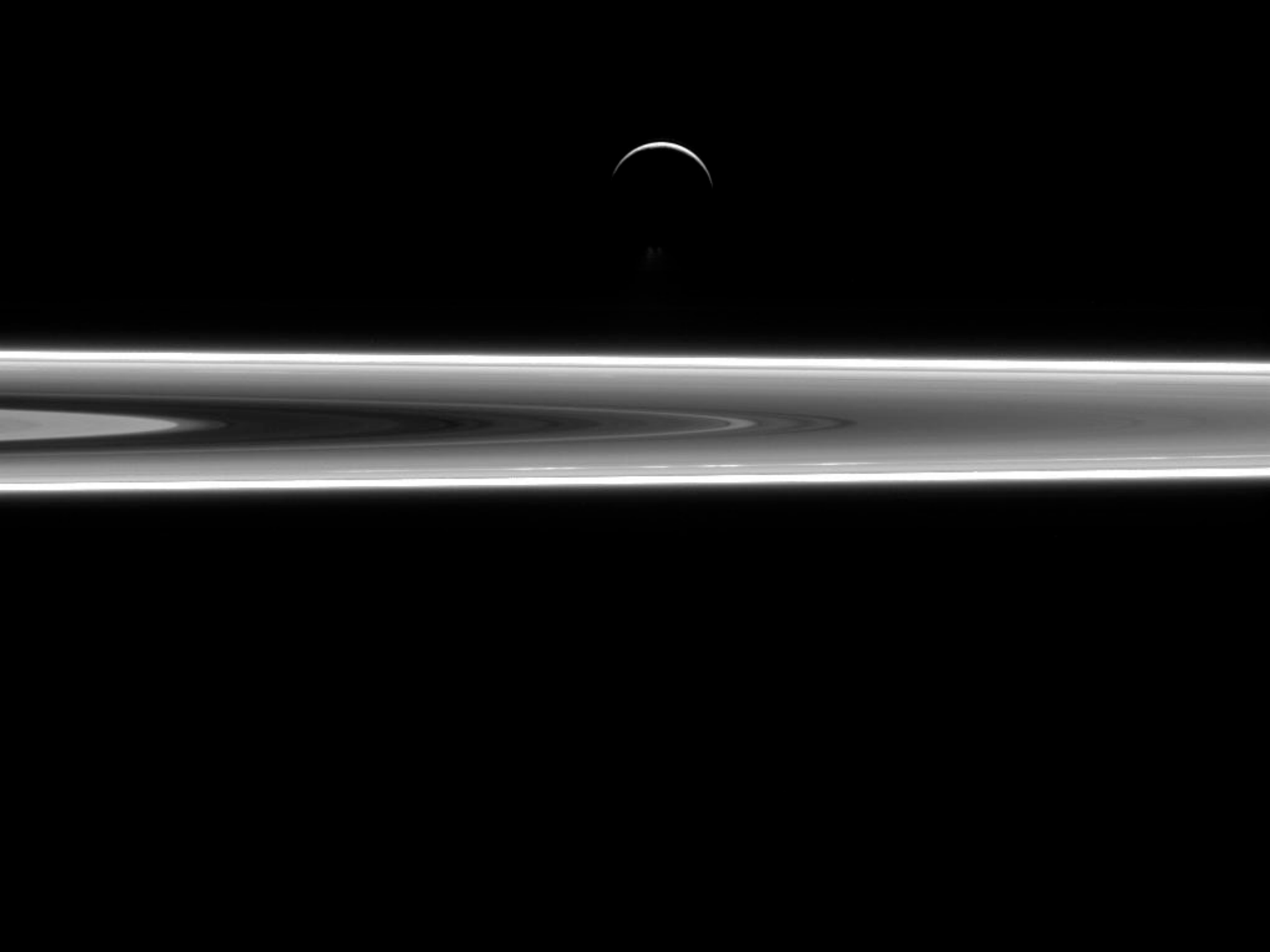
**NASA fully intends to fly the current Clipper mission, but we must be ready to curb resource and cost growth if it occurs**



# New Frontiers 4

- New Frontiers 4 AO was released in December with proposals due April 28.
  - 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.
- November 2017: Selection for competitive Phase A studies
- October 2018: Concept study reports due
- May 2019: Announcement of flight selection
- ***All dates<sup>1</sup> are targets, not guarantees.***

<sup>1</sup>Except the proposal due date!







# Topics of Note at this Meeting



- The dramatic end of Cassini's exploration is near – how do we as a community want to celebrate this?
- ROW goals document is mature – what is the next step, and does the document provide what we need for that step?
- Participating Scientists study
- Diverse and inclusive mission teams





# Questions?

