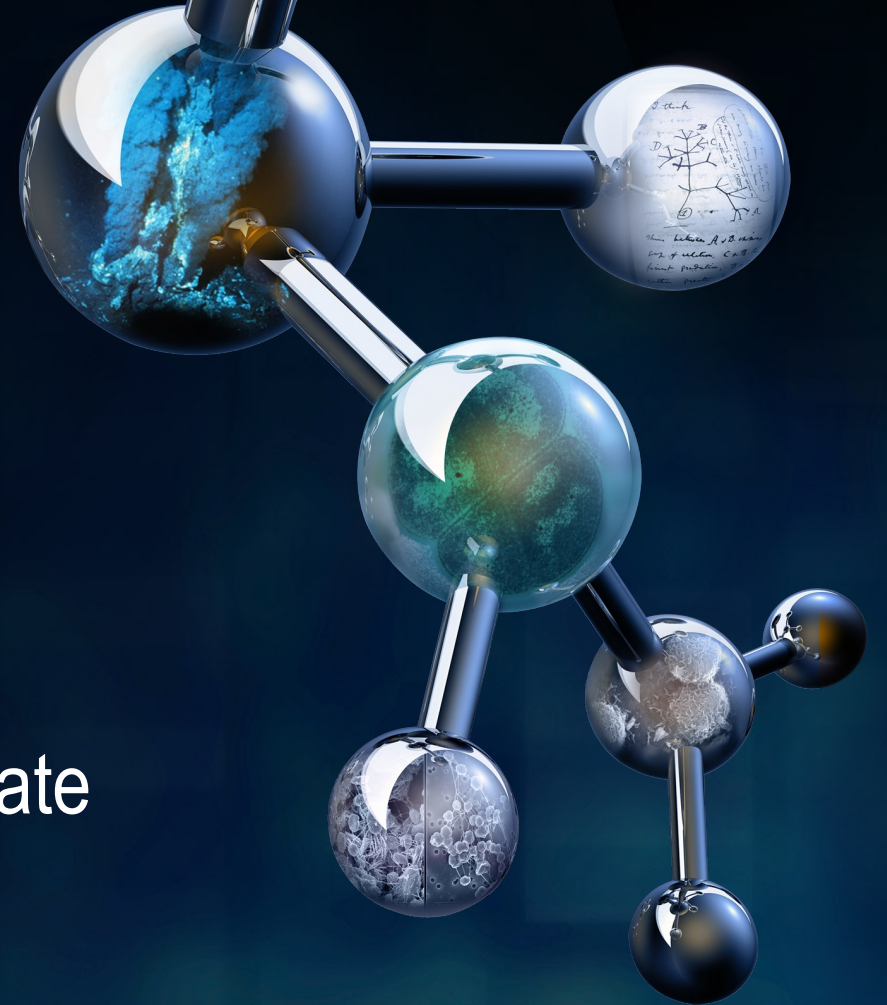




EXPLORE

Astrobiology Program Update

June 23, 2022





New Requirements

• New requirements-Always read C.1 Fieldwork

- Proposers conducting field research must include a description of their use of field site(s) that demonstrates:
 - Respect for the values of other users of the site by considering the impact that their work will have on the environment (e.g., sensitive ecosystems or historic properties of religious, cultural, or scientific significance).
 - A research plan that reduces impact to the site (if any).
 - The intention to obtain relevant permits and follow their guidelines.
 - Moreover, to help create an environment that is free of harassment and discrimination, proposers must cite a specific policy, code of conduct, or ground rules provided to participants in advance of the fieldwork. This information will be provided by proposers in response to an NSPIRES cover page question.



Exobiology Program

- Starting in ROSES-21 – No Due Dates
 - Overlap between ROSES years
 - Regular reviews (like a bus schedule)
 - Regular selections and managed funding (like a household budget)
- Response times – slightly better on average
- One-year prohibition on resubmission
- External Reviews – more important than before!



Habitable Worlds

- DAPR – REALLY pay attention to rules (SMD DAPR website <https://science.nasa.gov/researchers/dual-anonymous-peer-review>)
- Motivated by a successful study conducted for the Hubble Space Telescope, SMD is evaluating proposals submitted to numerous ROSES program elements using dual-anonymous peer review (DAPR).
- Under this system, not only are proposers not told the identity of their reviewers, the reviewers are not told the identity of the proposers, until after they have evaluated the scientific merit of all of the anonymized proposals.
- The results of SMD's pilot implementation of dual-anonymous peer review in ROSES-2020 is consistent with improvements, both in terms of the overall quality of the review process, as well as in the demographics of awardees.



ICAR (Interdisciplinary Consortia for Astrobiology Research)

DATES:

- Step-1 due Sept 15, 2022
- Step-2 due Jan 17, 2023

Areas of Research Solicited:

- Biosignatures and Life Detection (RCN-NfoLD)
- Habitability and Detection of Life on Ocean Worlds (RCN-NOW)
- Habitability and Detection of Life on Exoplanets (RCN-NExSS)
- Prebiotic Chemistry in Early Earth Environments (RCN-PCE3)
- Primitive Cells to Multicellularity (RCN-LIFE)



Attendees: 1044 (a 12% increase over 2019 registration)

Onsite Attendees

260 students

384 professionals

8 retired

Online Attendees

137 students

241 professionals

14 retired

35 countries represented (29 were represented in 2019)



KEYNOTES & PLENARIES



DR. REVA KAY WILLIAMS

Sunday, 15 May 2022

6:30 PM ET

Lecture

[LEARN MORE](#)



NICOLE KING

Monday, 16 May 2022

8:30 AM ET

Lecture

[LEARN MORE](#)



KATHRYN STACK MORGAN

Tuesday, 17 May 2022

8:30 AM ET

Lecture

[LEARN MORE](#)



MEENAKSHI WADHWA

Tuesday, 17 May 2022

8:30 AM ET

Lecture

[LEARN MORE](#)



DR. BETÜL KAÇAR

Wednesday, 18 May 2022

8:30 AM ET

Lecture

[LEARN MORE](#)



DR. AOMAWA SHIELDS

Thursday, 19 May 2022

8:30 AM ET

Lecture

[LEARN MORE](#)



TRACY DRAIN

Thursday, 19 May 2022

6:30 PM ET

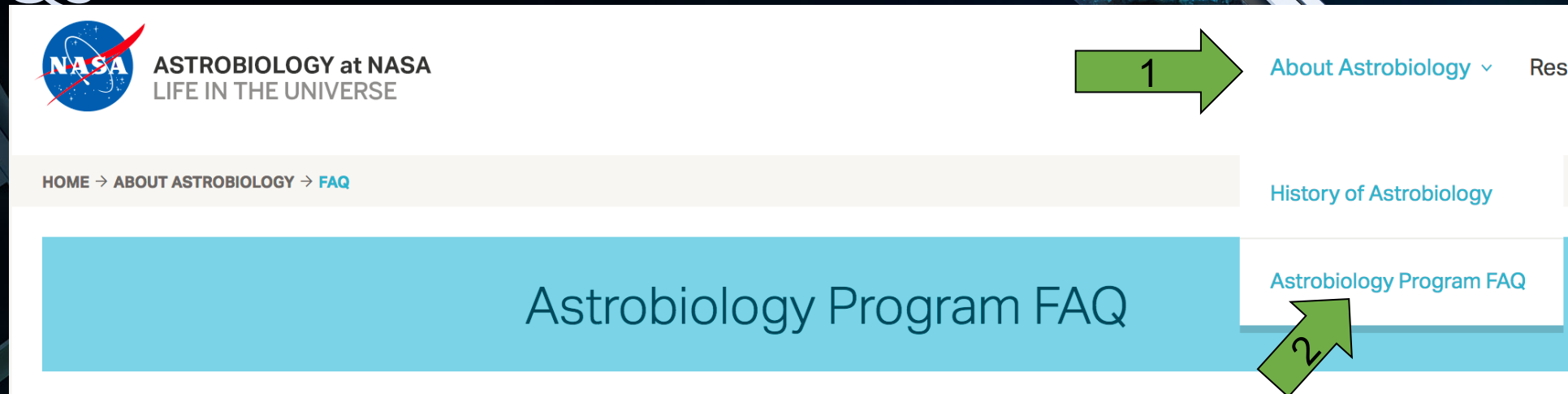


THE VENUS DIALOGUES: GETTING TO KNOW OUR NEIGHBOR: PROGRESS AND PROSPECTS IN A NEW GENERATION OF VENUS RESEARCH

Friday, 20 May 2022


8:30 AM ET

NASA Astrobiology Program - FAQs



This document contains answers to Frequently Asked Questions about the Astrobiology Program organized by topical areas:

- NASA Astrobiology Program (goals, 2015 Strategy, history, contact)
- Funding Astrobiology Research (ICAR, Workshops, Early Career, topic-specific programs)
- Coordinating Astrobiology Research (RCNs: what, who, how)



FAQ: What is a Research Coordination Network (RCN)?

A Research Coordination Network (RCN) is a virtual collaboration structure that helps support groups of investigators to communicate and coordinate their research across disciplinary, organizational, divisional, and geographic boundaries. NASA has modified a mechanism utilized by NSF to achieve the research goals for the Astrobiology Program.

The NASA Astrobiology RCNs are a mechanism for community collaboration. Each RCN will have a steering committee comprised of the PIs of all teams who have elected to join to join, both from large teams selected from the ICAR solicitation as well as smaller teams from relevant [ROSES](#) R&A programs. Additionally, the NASA Astrobiology Program, along with representatives of relevant research elements and SMD Divisions, will identify co-leads and potential members of the RCN and provide funding to support the logistical requirements of the RCN. The Astrobiology RCNs will be regularly reviewed (~6 years) by a Senior Review-like independent panel of experts to provide input to any decision to continue, modify, or sunset the RCN. Because RCNs are only a method for coordination, the sunseting of an RCN will have no effect on the primary research award, which will continue through the original duration. New RCNs may also be established as the science in astrobiology evolves, new missions come on line, or the priorities of NASA shift.



FAQ: How do the the RCNs relate to the goals of the astrobiology program?

In general, the topics for the [Research Coordination Networks](#) (RCNs) were selected based on broad research areas of importance articulated in the [2015 Astrobiology Science Strategy, An Astrobiology Strategy for the Search for Life in the Universe](#) (National Academy of Science Engineering and Medicine), and on the need for foundations research for ongoing and future missions planned with astrobiological significance.

In 2017 Congress modified the **51 U.S. Code § 20102 – Congressional declaration of policy and purpose [for NASA]** to specifically call out astrobiology in the agency's objectives.

NASA ... "shall be conducted so as to contribute materially to one or more of the following objectives: (10) The search for life's origin, evolution, distribution and future in the Universe."

51 U.S. CODE § 20102
Congressional declaration of policy and purpose [for NASA]

The search for life's **ORIGIN**, **EVOLUTION**, **DISTRIBUTION**, and **FUTURE** in the Universe.



Prebiotic Chemistry and
Early Earth Environments

PCE3



LIFE: Early Cells to
Multicellularity

ECM



Network for Life Detection

NFOLD



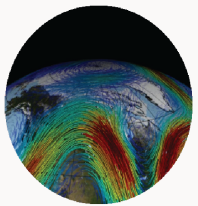
The Nexus for Exoplanet
System Science

NExSS



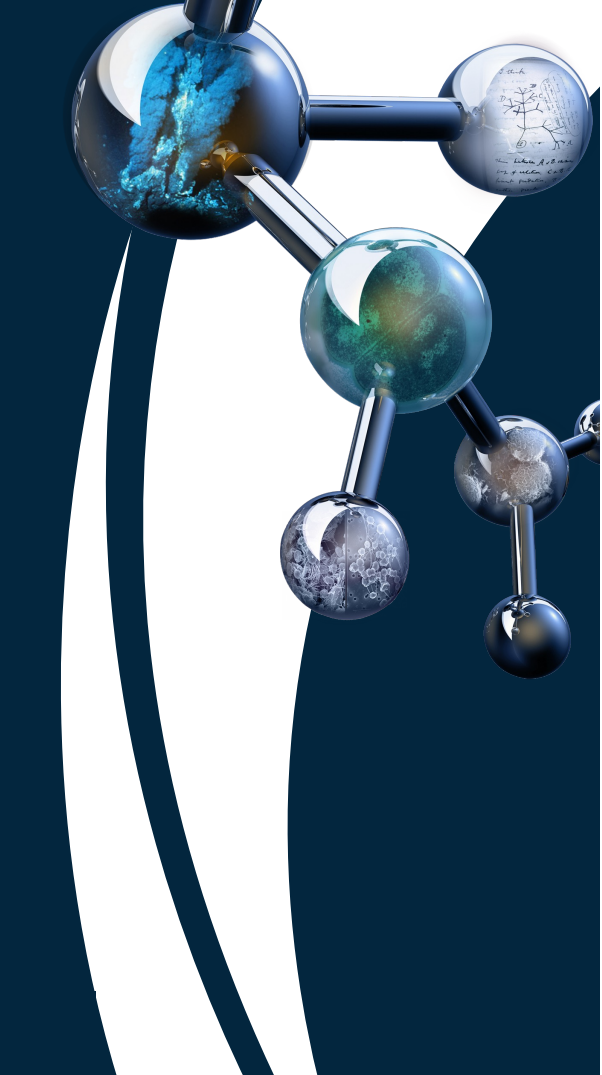
Network for Ocean Worlds

NOW



NASA Earth Sciences
Division

NASA ESD



The themes of the RCNs map to ongoing and future missions planned and being considered with Astrobiological significance.





Dr. Ariel Anbar
ASU



Dr. Betül Kaçar
UW – Madison



Dr. Frank Rosenzweig
Georgia Tech



Dr. Mary Droser
UC – Riverside

Earth is the only planet known to harbor life.

If we can't understand it here, how can we look for it elsewhere?

LIFE will discern rules of co-evolution that will enable us to predict how life could evolve on worlds other than our own, and how we might search for it.

Topics include environmental pressures and evolutionary opportunities behind:

- *Establishment of the first cells*
- *Rise of LUCA and LECA*
- *Life's expansion to planetary scale*
- *Compartmentalization of function within and among cells*
- *Rise of multicellularity and cellular differentiation*



LIFE

FROM EARLY CELLS TO MULTICELLULARITY

Upcoming workshops:

"Reconstruction of Ancient Metabolisms" in Madison, WI

Join us: LifeRCN.org



LIFE: Early Cells to Multicellularity





Network for Ocean Worlds



Primary Research Themes

- Physical Processes on Ocean Worlds
- Biogeochemical Cycles on Ocean Worlds
- Investigating Earth Analogs (Sites & Processes)
- Technology Development (Platforms & Sensors)

Forthcoming Workshop

- Ocean World Analogs
 - October 2022 (*Provisionally 13-15th*)
 - Denver, CO (*Museum of Nature & Science*)



NASA's Interdivisional Interest in Ocean Worlds Research

- Ocean World research requires a shared vision among and across disciplines
- Expanding collaborations between Earth ocean scientists and extraterrestrial ocean scientists can provide access to many years of research on the Earth and apply that to Ocean Worlds.
- Likewise, it provides different perspectives to look at our own planet.
- The development of technologies for ocean exploration can be applied to **all** oceans
- NASA's interdivisional interests seeks to spark cross-divisional conversations and to identify areas of collaboration and mutual interest
- As a result of this, Oceans Across the Solar System was created

Ocean Worlds

Image credit: K.P. Hand, NASA-JPL.

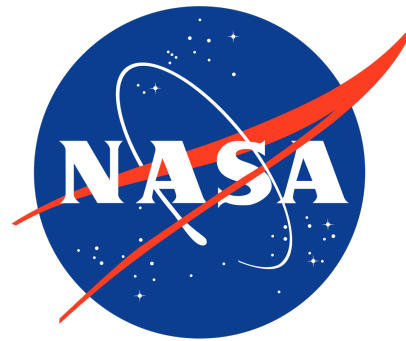


Image credit:
NASA

Oceans Across the Solar System Status

- Workshop in 2019
- OCB session June 2021
- OASS white paper posted summer 2021 - different sections outline some of the priority areas for ocean research across the solar system, identify existing gaps, and provide ideas for developing testable ideas based on the Earth System
- Oceans Across the Solar System special issue of Oceanography – to be published summer 2022
- Interdisciplinary ROSES element (ESD): Ocean Worlds: Research at the Interface (NOIs due 10/14/2022; proposals due 11/16/2022)

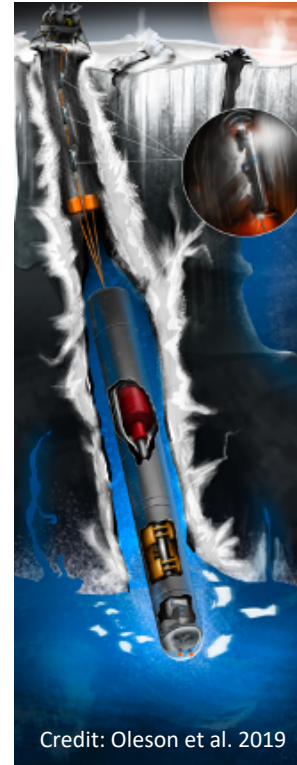
Oceanography



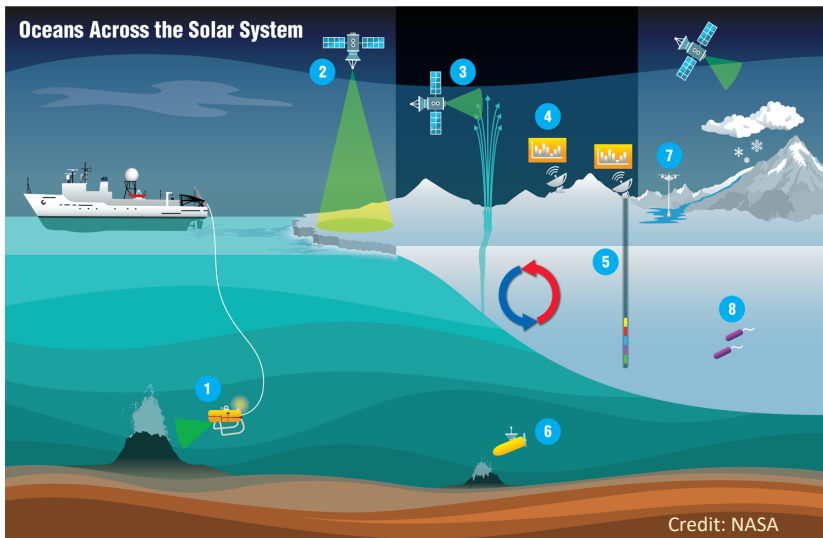
NO**W**
Network FOR
Ocean Worlds

Oceans Across the Solar System

- Ocean system science to inform the exploration of ocean worlds – German et al.
- Defining and characterizing habitable environments in ocean world systems – Glass et al.
- Understanding the properties of environmental change in ocean worlds – Grebmeier et al.
- Research in analog environments to enable studies of ocean worlds - Arrigo
- Leveraging Earth hydrosphere science in the search for life on ocean worlds – Hoehler et al.
- Technologies for in situ and remote sensing exploration of ocean worlds – Chirayath et al.



Credit: Oleson et al. 2019
Fig 2. Artist concept for a cryobot probe



Credit: NASA

Network for Life Detection (NfoLD)

Advancing the science and technology required to search for evidence of life beyond Earth



Heather Graham, co-lead



Tori Hoehler, co-lead



Britney Schmidt, co-lead

“Future of the Search for Life”

Life detection science and technology workshop, Spring 2022

Future of the Search for Life (FoSL) workshop



March 21-25 and April 11-15

FoSL Organizing Committee

Richard Quinn (NASA Ames Research Center)
Marc Neveu (NASA Goddard Space Flight Center)
Laurie Barge (NASA Jet Propulsion Laboratory)
Kate Craft (JHU Applied Physics Laboratory)
Chris German (Woods Hole Oceanographic Institution)
Stephanie Getty (NASA Goddard Space Flight Center)
Christopher Glein (Southwest Research Institute)
Macarena Parra (NASA Ames Research Center)

Who's interested?

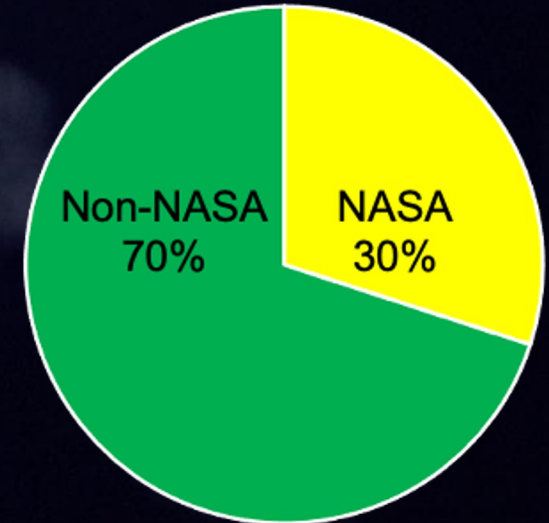
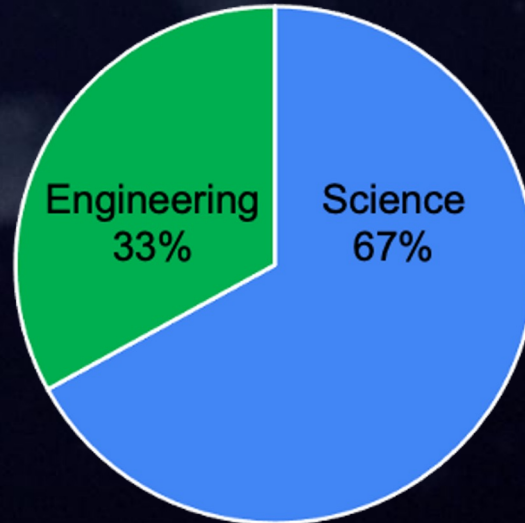
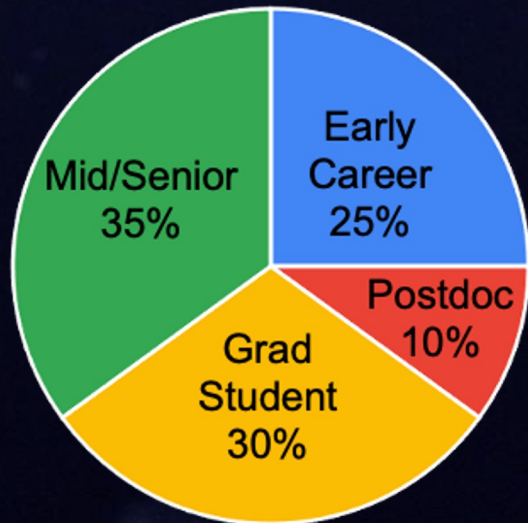
- Mary Voytek – NASA Astrobiology Program
- Carolyn Mercer – NASA Planetary Exploration Science Technology Office (PESTO)
- Network for Life Detection (NfoLD)

Future of the Search for Life Science and Engineering Workshop



Purpose:

- Develop new and creative approaches to in-situ searches for life in our solar system
- Foster new science and engineering partnerships
- 2 Weeks (March & April 2022), half-days, virtual, small breakouts



100 workshop participants

Think Beyond the State of the Art!



- **20+ years** from now (2040's)
- What **signs of life** should we look for, beyond Europa Lander / Enceladus Orbilander-type objectives? Broaden the set.
- What **levels of detection** are needed?
- Engage those from **outside usual NASA backgrounds**
- Engage **engineers** in science measurement development

Deliverables to NASA HQ and community



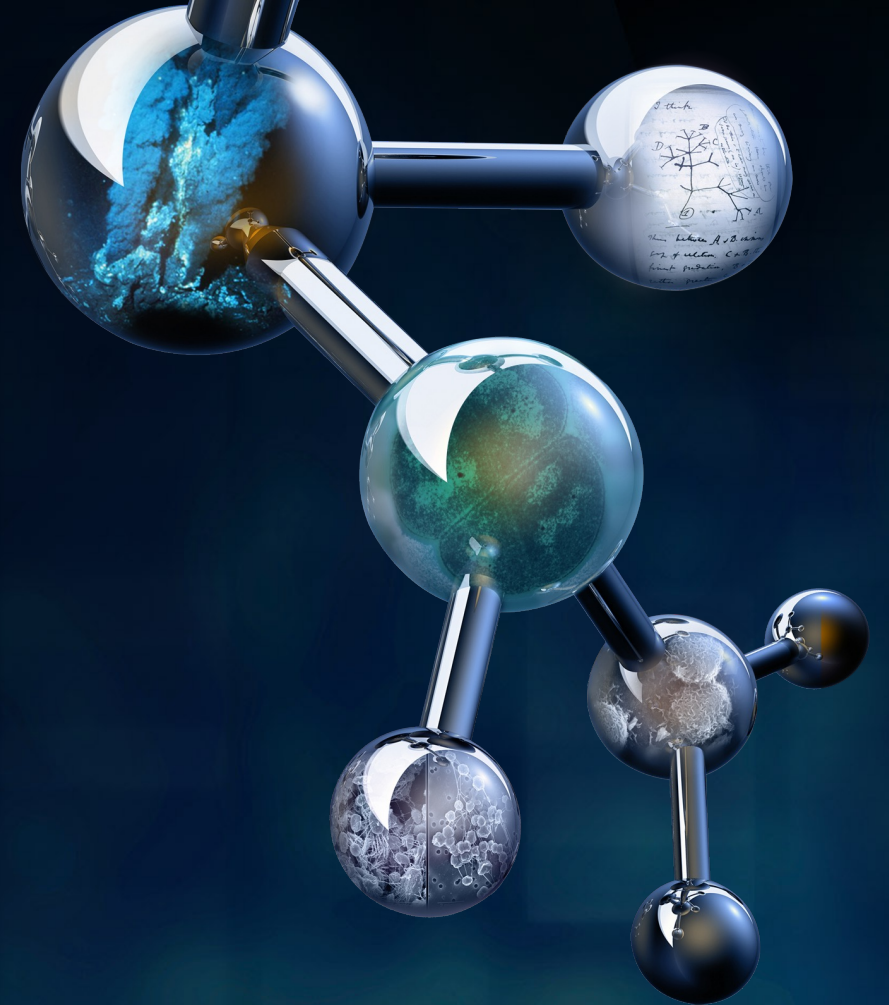
Set of science traceability matrices (1 per breakout group)

Flowed down to quantified measurement needs

Written context to support the STMs

Report to help guide research and technology development

QUESTIONS?



Nuts and Bolts of the Astrobiology Program RCNs:

- The NASA Astrobiology RCNs are a mechanism for community collaboration.
- Each RCN will have a steering committee comprised of the PIs of all teams who have elected to join to join, both from large teams selected from the ICAR solicitation as well as smaller teams from relevant ROSES R&A programs.
- The NASA Astrobiology Program, along with representatives of relevant research elements and SMD Divisions, will identify co-leads and potential members of the RCN and provide funding to support the logistical requirements of the RCN.
- The Astrobiology RCNs will be regularly reviewed (~5 years) by a Senior Review-like independent panel of experts to provide input to any decision to continue, modify, or sunset the RCN.
- New RCNs may also be established as the science in astrobiology evolves, new missions come on line, or the priorities of NASA shift.

Expected outcomes for the Astrobiology Program RCNs:

- Investigators carry out and propose interdisciplinary research that addresses new topics through new collaborations.
- Produces a plan for utilization of current mission data (if applicable).
- Spawns ideas for new and exciting missions, and encourages participation in and contributions to missions from planning through operations (if applicable).
- Identifies new targeted technologies or instrumentation needed, but not yet reported elsewhere.
- Influences Decadal Surveys for all NASA Science Mission Directorate (SMD) Divisions
- Enhances international engagement.
- Supports continued development of the astrobiology community.