



NASA Astrobiology Institute *Overview*

Penelope Boston, Director
NASA Astrobiology Institute
NASA Ames Research Center

March 10, 2017

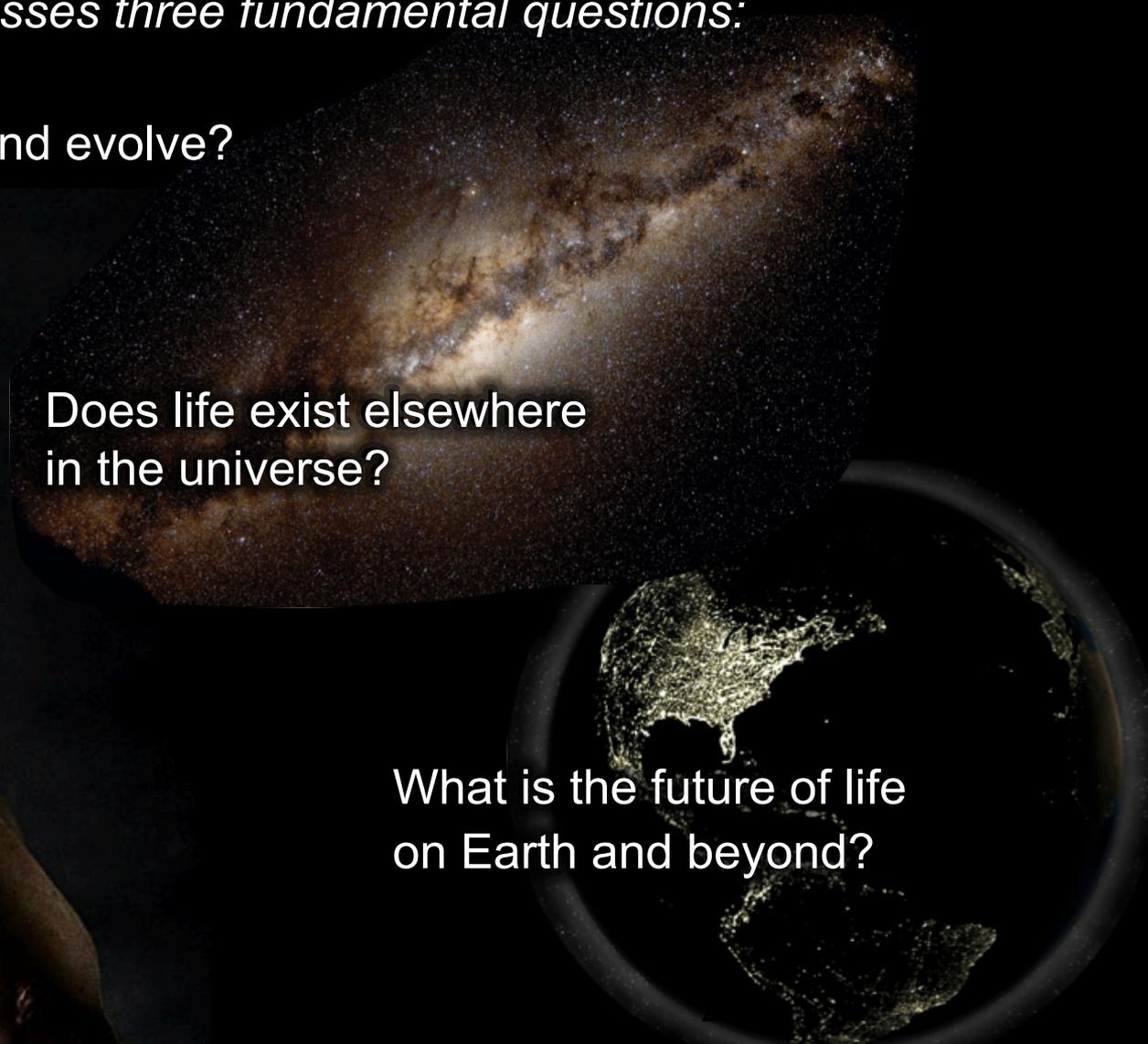
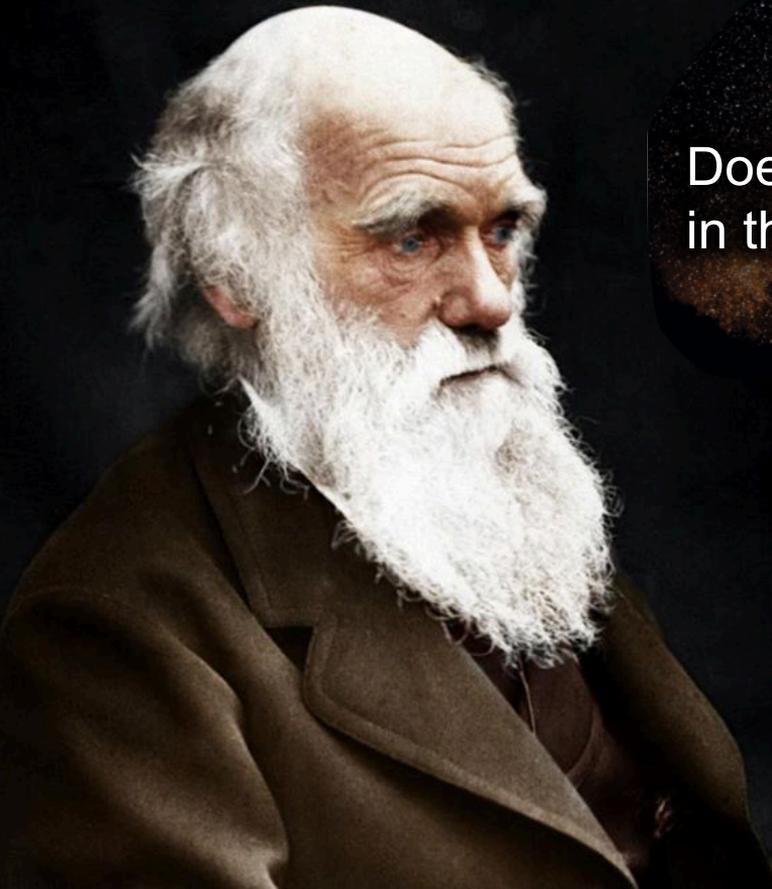
The Astrobiology Enterprise

Addresses three fundamental questions:

How does life begin and evolve?

Does life exist elsewhere
in the universe?

What is the future of life
on Earth and beyond?



NASA Astrobiology Institute

LIFE IN THE UNIVERSE

Created in 1998

Solar System and Beyond:
Our Journey of Discovery

Exoplanet
Biosignatures

Icy Worlds:
Habitability
and Life
Detection

Mars: *NASA's Journey to Mars*
Habitability
of Early Mars

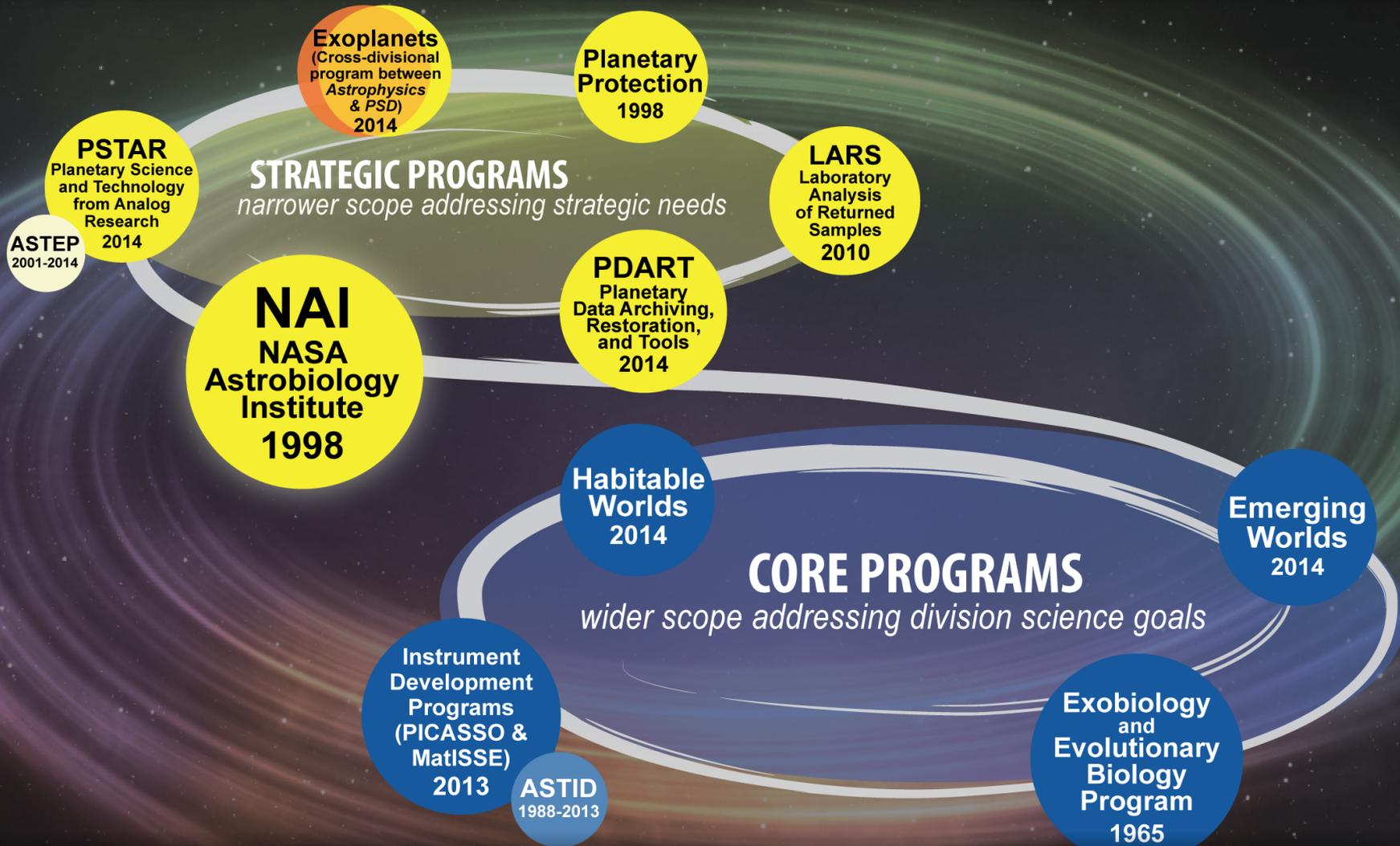
Technology: *Technology Drives Exploration*
Global Partnerships Employing
Collaborative Technologies

Origin and
Nature of Life,
Co-evolution
with Planet Earth

NAI: the Community

NAI Within NASA Astrobiology Content

Planetary Science Division (PSD), Research & Analysis Program

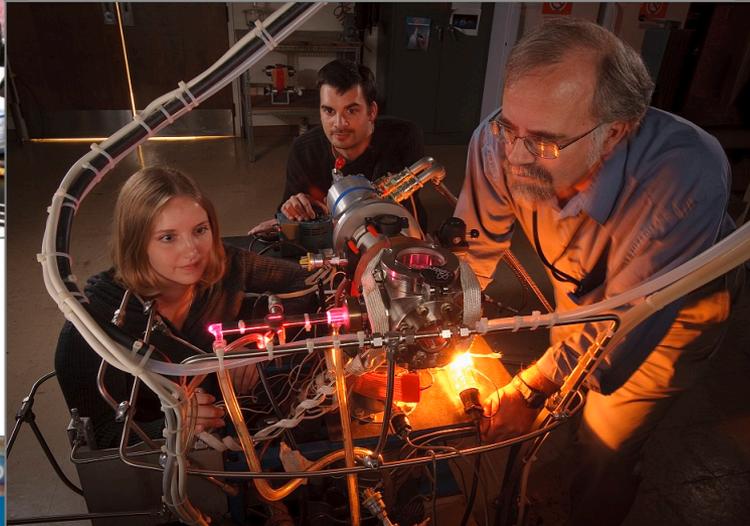


NAI Mission Statement

5 Elements



Train the Next Generation
of Astrobiologists



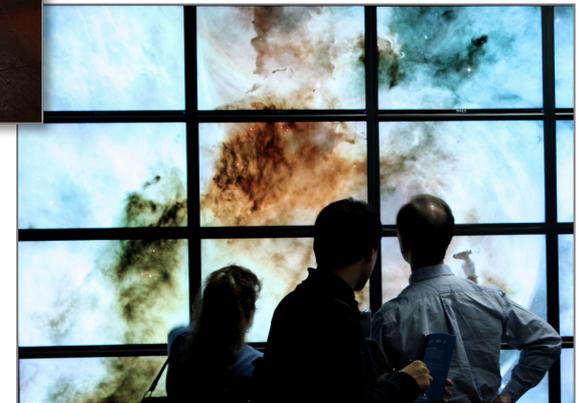
Collaborative,
Interdisciplinary Research



Provide Leadership for
NASA Space Missions



Education and Outreach
An area in transition



Information Technology
for Research

NAI: A 'Virtual' Institute Without Walls

- Created in 1998
- Competitively-selected science teams, each a consortium (currently 12 teams)
- ~600 members at ~100 participating institutions
 - ~320 “senior” scientists
 - ~280 postdocs and students
 - ~20 members of the US National Academy of Sciences
- Managed/integrated by a central office at NASA Ames Research Center

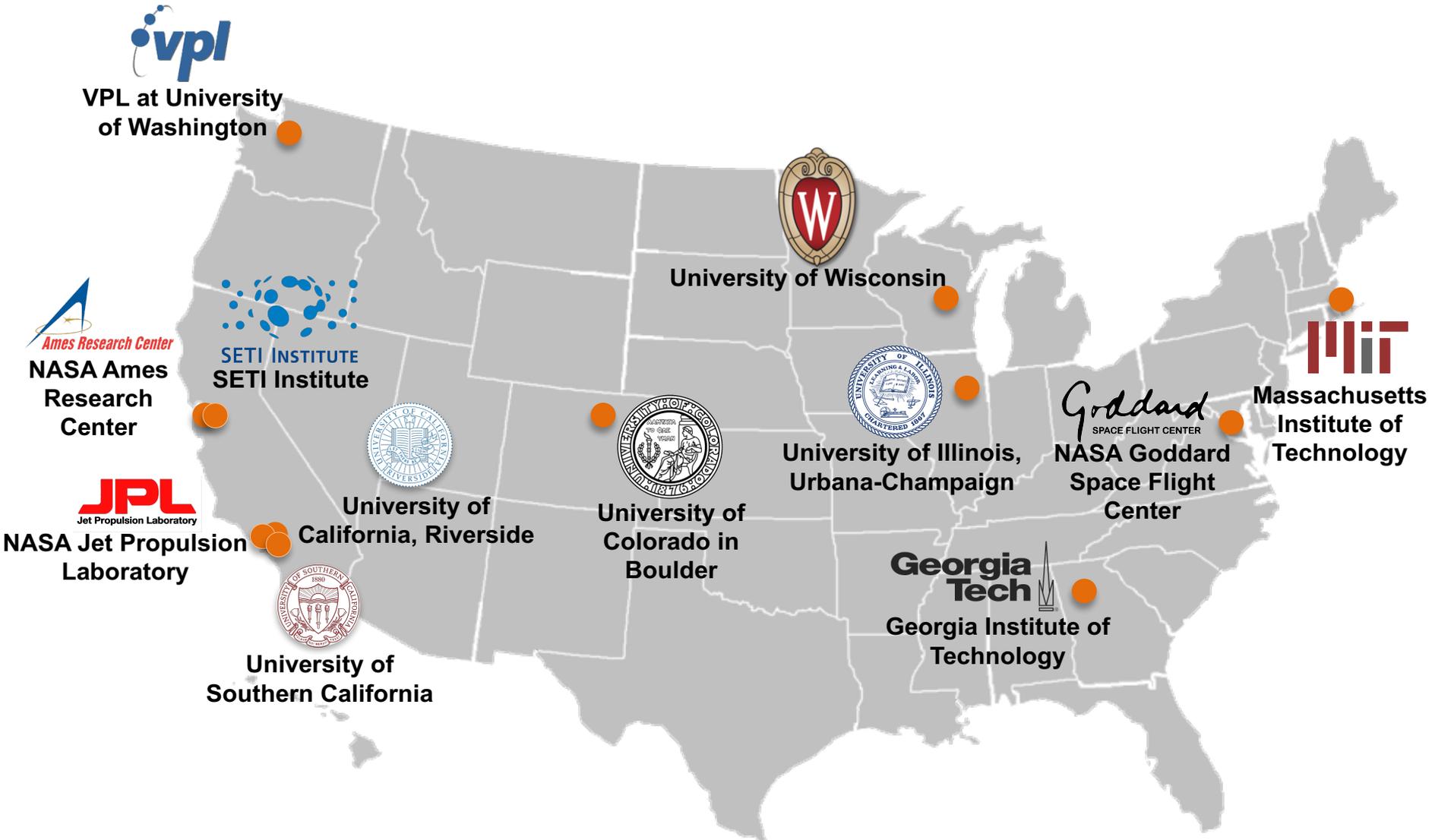
CAN 6 TEAMS

- Massachusetts Institute of Technology
- University of Illinois at Urbana-Champaign
- University of Southern California
- University of Wisconsin
- VPL at University of Washington

CAN 7 TEAMS

- NASA Goddard Space Flight Center
- NASA Ames Research Center
- NASA Jet Propulsion Laboratory
- SETI Institute
- University of Colorado in Boulder
- University of California, Riverside
- Georgia Institute of Technology

NAI CAN 6 & 7 Teams



Current Topics, CAN 6

<https://nai.nasa.gov/teams/>

- 1) Towards Universal Biology: Constraints from Early and Continuing Evolutionary Dynamics of Life on Earth - University of Illinois, Nigel Goldenfield, PI
- 2) Habitability, Life Detection, and the Signatures of Life on the Terrestrial Planets, University of Wisconsin, Clark Johnson, PI
- 3) Life Underground, University of Southern California, Jan Amend, PI
- 4) Foundations of Complex Life: Evolution, Preservation and Detection on Earth and Beyond, Massachusetts Institute of Technology, Roger Summons, PI
- 5) The Virtual Planet Laboratory, University of Washington, Victoria Meadows, PI

Current Topics, CAN 7

<https://nai.nasa.gov/teams/>

- 1) Changing Planetary Environments & the Fingerprints of Life, SETI Institute, Nathalie Cabrol, PI
- 2) Icy Worlds: Astrobiology at the Rock-Water Interface and Beyond, Jet Propulsion Laboratory, Isik Kanik, PI
- 3) Origin and Evolution of Organics and Water in Planetary Systems, NASA Goddard Spaceflight Center, Michael Mumma, PI
- 4) The Evolution of Prebiotic Chemical Complexity and the Organic Inventory of Protoplanetary Disks and Primordial Planets, NASA Ames Research Center, Scott Sandford, PI
- 5) Alternative Earths: Explaining Persistent Inhabitation on a Dynamic Early Earth, University of California, Riverside, Tim Lyons, PI
- 6) Reliving the Past: Experimental Evolution of Major Transitions in the History of Life, Georgia Institute of Technology, Frank Rozenzweig, PI
- 7) Rock-Powered Life: Revealing Mechanisms of Energy Flow from the Lithosphere to the Biosphere, University of Colorado, Alexis Templeton, PI



Current Synergy Themes

1) Serpentinizing Systems

(Univ. of Colorado, USC, SETI Inst., JPL, U.C.-Riverside, Georgia Tech, Univ. of Wisconsin, Univ. of Illinois)

2) Habitable Planetary States, the Evolution of Microbial Life, and their Astronomical Biosignatures

(U.C.-Riverside, Georgia Tech., Univ. of Washington, Univ. of Wisconsin, MIT, SETI Inst., JPL, Univ. of Colorado, USC)

3) Planetary Inventory of Organics and Water, and the Origin of Life

(GSFC, U.C.-Riverside, MIT, Univ. of Illinois, NASA Ames)

4) Environmental Change and Biosignatures

(SETI Inst., Univ. of Wisconsin, Univ. of Colorado, USC, U.C.-Riverside, MIT, others)

5) GeoBioCell Applications

(Univ. of Illinois, Georgia Tech., USC, Univ. of Wisconsin, JPL, Univ. of Colorado, U.C.-Riverside, GSFC)

6) Evolution of Complex Life

(Georgia Tech., MIT, SETI Inst., U.C.-Riverside, USC, Univ. of Colorado)

Ongoing Inter-team Activities



- 1) Team Principal Investigators comprise the Executive Council (EC) of NAI.
- 2) 2 Face-to-Face EC annual meetings at rotating locations hosted by team PI institutions.
- 3) 9 monthly videocons of the EC through the year.
- 4) Opportunities for extended science talks presented by NAI Team members at above interactions.
- 5) Short & succinct reports on a monthly basis providing information on ongoing team activities and achievements.
- 6) Annual report (now in new STREAMLINED FORM!!!)
- 7) Opportunity to provide “science nuggets” of extraordinary interest for consideration by the Planetary Science Division’s informational use.
- 8) Team participation is encouraged at the virtual NAI Director’s Seminars, NASA Postdoctoral Program Seminars and Workshops Without Walls.

International Partners

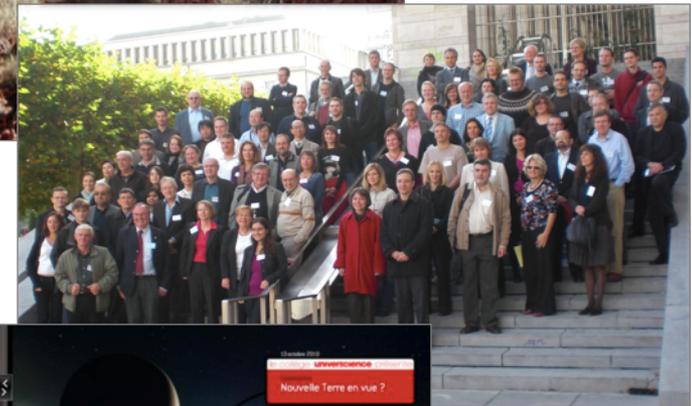
See: astrobiology.nasa.gov/nai/international-partners/

ASSOCIATE PARTNERS:

- Australian Centre for Astrobiology
- Centro de Astrobiología (Spain)

AFFILIATE PARTNERS

- Astrobiology Society of Britain
- Canadian Astrobiology Network
- European Exo/Astrobiology Network Association (EANA)
- Helmholtz Alliance: Planetary Evolution and Life (Germany)
- Instituto de Astrobiología Colombia
- Japan AstroBiology Consortium (JABC)
- Nordic Network of Astrobiology
- Russian Astrobiology Center
- Société Française d'Exobiologie
- Sociedad Mexicana de Astrobiología
- UK Centre for Astrobiology
- USP Research Unit in Astrobiology (NAP-Astrobio) (San Paolo)



The background of the slide features a cosmic scene with a field of stars and a large, reddish-orange planet, likely Mars, on the right side. The text 'Other NAI Activities' is centered at the top in a large, white, sans-serif font.

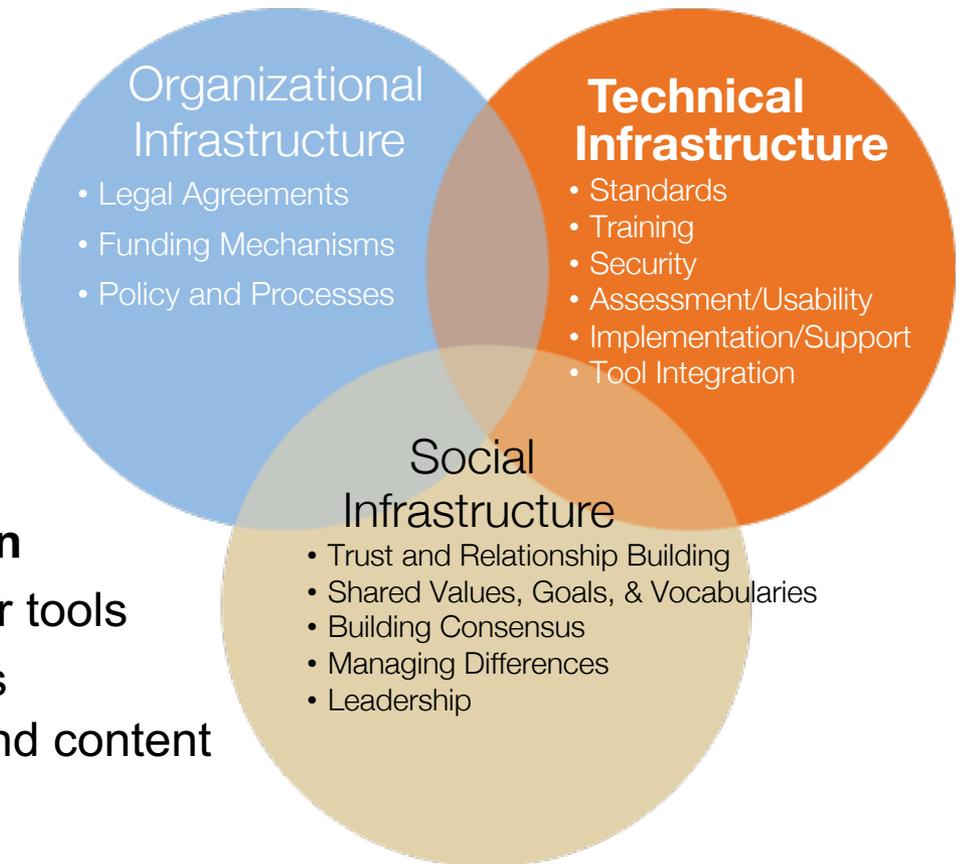
Other NAI Activities

- Minority Institution Research Support (MIRS) Program (*for faculty*)
- Postdoctoral Fellowship Program (*for postdoctoral scholars*)
- The Lewis and Clark Fund for Exploration and Field Research in Astrobiology (*for graduate students & postdocs*)
- Early Career Collaboration Award (*for graduate students & postdocs*)
- Meeting and Workshop Support
- Support as desired for AbSciCon (biannual conference)
- Support as possible for AbGradCon (graduate student led conference)

Collaboration Infrastructure

APPROACH

- Provide a **suite of tools**
- Standards based when possible
- Cross platform and mobile support
- Integrate multiple technologies for better solutions
- **Transparent, reliable technologies**
- Evaluate and implement for usability
 - Reduction in help calls
- **Simple training and documentation**
- We live in our community, we use our tools
 - Allows for iterative improvements
 - Deep understanding of culture and content
 - Flexibility
- **...Empower the end-users**



NAI: Workshop Without Walls

PLoS: Workshops without Walls: Broadening Access to Science around the World

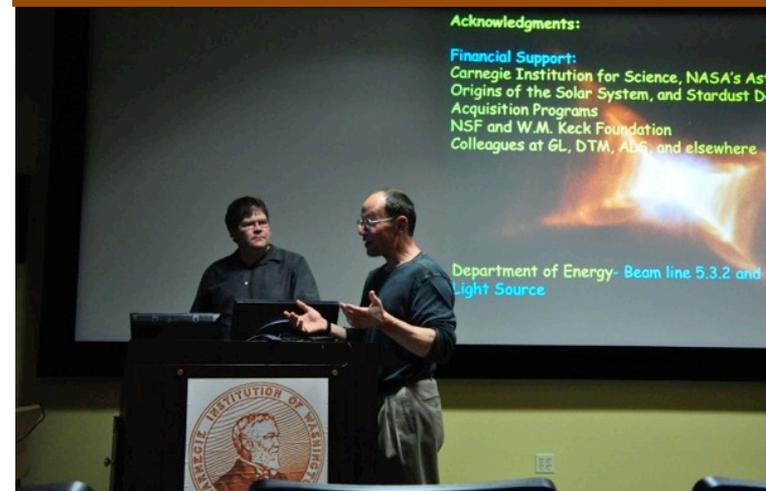
ARC showing 6 videocon sites



University of Hawaii



Carnegie Institution of Washington



Rensselaer Polytechnic Institute



International Astrobiology Newsletter (IAN)

<https://ian.arc.nasa.gov>



International Astrobiology Newsletter
A place for sharing astrobiology information from around the world

Home Issues

HOME

RESOURCES

SUBMIT AN ANNOUNCEMENT

SUBSCRIBE

UNSUBSCRIBE

ISSUES

COMMENTS

January 2015 Issue

In this issue:

Conferences, Field Trips and Workshops

March 2015

2 - 5 **Workshop on Ground and Space Observatories: A Joint Venture to Planetary Science**
Santiago, Chile
Abstract Submission Deadline: Closed - November 24, 2014

22 - 27 **Habitability in the Universe: From the Early Earth to Exoplanets**
Porto, Portugal
Abstract Submission Deadline: Closed - January 16, 2015

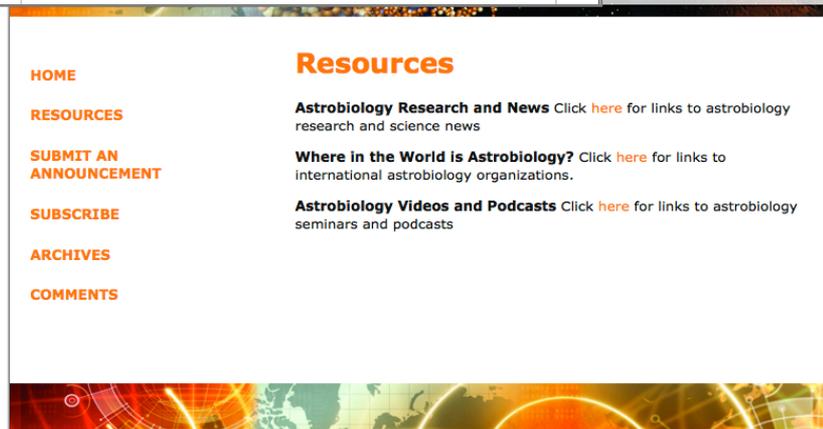
29 **28th Meeting of the Israel Society for Astrobiology and the Study of the Origin of Life (ILASOL)**
Beersheva, Israel
Abstract Submission Deadline: March 1, 2015

April 2015

A quarterly newsletter providing information about astrobiology events and opportunities around the world to the international astrobiology community

- Content provided by the community
- Distribution ~5000 world-wide

- Topic Headings
 - Conferences, Field Trips, and Workshops
 - Student & Early Career Opportunities
 - Funding Opportunities
 - Other Opportunities
 - Meeting Reports



HOME

RESOURCES

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COMMENTS

Resources

Astrobiology Research and News Click [here](#) for links to astrobiology research and science news

Where in the World is Astrobiology? Click [here](#) for links to international astrobiology organizations.

Astrobiology Videos and Podcasts Click [here](#) for links to astrobiology seminars and podcasts

NAI Website

<https://nai.nasa.gov>

The screenshot shows the top of the NASA Astrobiology Institute website. At the top left is the NASA logo and the text "NATIONAL AERONAUTICS AND SPACE ADMINISTRATION". To the right, there is a user profile "Miki Huynh" with links for "Admin" and "Log Out", and a search bar with a "GO" button. Below this is the "NASA ASTROBIOLOGY INSTITUTE" logo. The main content area features a large blue banner with the text "STATEMENT OF INTENT TO RELEASE CAN 8 FOR NAI" and "Official release of CAN 8 will be January 2017 with Step 1 proposals due March." with a "READ MORE" button. To the right, there are several article teasers, including "METHANE MUTED: HOW DID EARLY EARTH STAY WARM?", "THE ART OF YELLOWSTONE", and "ASTROBIOLOGY SCIENCE OF (ABSC)".

Intended for:

- Science-interested public
- Educators/students
- NAI researchers and the astrobiology science community

A red circle highlights the navigation menu on the left side of the website. The menu items are: About NAI, Our Research, Teams, Funding Opportunities, Focus Groups, International Partners, Education and Outreach, Collaborative Tech, Newsletter, Careers and Employment, Seminars and Workshops, Calendar, Executive Council, and Directory. Below the menu is a section for "Articles".

Scientists in Astrobiology Awarded 2016 MacArthur Genius Grants

Two scientists from the California Institute of Technology (Caltech) who are members of the NASA Astrobiology Program have been honored as 2016 MacArthur Fellows.

Dianne Newman, Microbiologist

The video player shows a portrait of Dianne Newman, a microbiologist, looking through a microscope. The text overlay reads: "Microbiologist Dianne Newman | 2016 MacArthur Fellow", "Dianne Newman", "Microbiologist", "2016 MacArthur Fellow", and "#MacFellow".

SUBSCRIBE TO:

SPOTLIGHT

- October 18 - 2016 Annual Meeting**
2016 Annual Meeting: Exploration and Science (October 18-20, 2016)
- October 18 - 2016 Annual Meeting**
Mineral Interactions of Microbes for Bioremediation (October 18-20, 2016)
- October 20 - 2016 Annual Meeting**
Postdoc Position at INAF-IAPS
- October 24 - Application Deadline:**
Tenure Track Assistant Professor in Astronomy or Planetary Science at Northern Arizona University
- October 25 - Application Deadline:**
Juno-Supporting Postdoctoral Position at JPL/Caltech
- October 26 - Application Deadline:**
Mars Mission Scientist at NASA Johnson Space Center
- October 26 - Application Deadline:**
Tenure Track W2/W3 Professorship in Experimental Planetology at the

NASA/Library of Congress Blumberg Astrobiology Chair

David Grinspoon
2012 – 2013



Steven Dick
2013 – 2014



Nathaniel Comfort
2015 – 2016



Luis Campos
2016 – 2017



- LOC is the nation's oldest federal cultural institution
 - Serves as research arm of Congress
 - Largest library in the World
- Chair conducts research at the interface of astrobiology and its humanistic aspects, particularly its societal implications