*The National Academies of*
SCIENCES • ENGINEERING • MEDICINE

DIVISION ON ENGINEERING AND PHYSICAL SCIENCES
SPACE STUDIES BOARD

# ASTROBIOLOGY SCIENCE STRATEGY FOR THE SEARCH FOR LIFE IN THE UNIVERSE

## Meeting #2: March 6–8, 2018

## Tuesday, March 6, 2018

National Academy of Sciences — Board Room
2101 Constitution Ave. NW — Washington, DC 20418

### OPEN SESSION

**Remote Access Information**
**U.S. (phone):** +1 (646) 558-8656 or +1 (669) 900-6833 — **Meeting ID**: 458-975-899
**France (phone)**: +33 (0) 1-8288-0188
**Australia (phone):** +61 (0) 2-8015-2088
**Link**: https://nasem.zoom.us/j/458975899

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| 12:00 p.m. | *Lunch available in the meeting room* | |
| 1:00 p.m. | Systems Biosignatures | Sara Walker, Arizona State University, *via Zoom* |
| 2:00 p.m. | Planetary Protection & the Search for Life in the Universe | Lisa Pratt, NASA HQ |
| 3:00 p.m. | *Break* | |
| 3:30 p.m. | From Habitability to Life: An Ecosystem Approach to the Search for Biosignatures Beyond Earth | Nathalie Cabrol, SETI Institute |
| 4:30 p.m. | Biosignature Preservation | Jochen Brocks, Australian National University, *via Zoom* |
| 5:00 p.m. | *Meeting adjourns for the day* | |

## Wednesday, March 7, 2018

National Academy of Sciences — Board Room
2101 Constitution Ave. NW — Washington, DC 20418

### OPEN SESSION

**Remote Access Information**
**U.S. (phone):** +1 (646) 558-8656 or +1 (669) 900-6833 — **Meeting ID**: 258-765-196
**France (phone):** +33 (0) 1-8288-0188
**Link**: https://nasem.zoom.us/j/258765196

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| 7:00 a.m. | *Working breakfast available in the meeting room* |

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| 8:00 a.m. | Briefing: ExoMars Rover and the Search for Life | Jorge Vago<br>European Space Agency, *via Zoom* |
| 9:00 a.m. | Future Space and Ground Astronomical Capabilities for Searching for Life on Exoplanets | Alycia Weinberger<br>Carnegie Institution for Science |
| 10:00 a.m. | *Break* | |
| 10:30 a.m. | Comparative Planetology and the Inner Solar System as a Gateway to the Exoplanets | Noam Izenberg<br>Applied Physics Laboratory |
| 11:30 a.m. | Life Detection Instrumentation in a Golden Age of Astrobiology | Stephanie Getty<br>Goddard Space Flight Center |
| 12:30 p.m. | *Lunch available in the meeting room* | |

**COMMITTEE WILL GO INTO CLOSED SESSION FOLLOWING LUNCH**

**Thursday, March 8, 2018**

National Academy of Sciences — Board Room
2101 Constitution Ave. NW — Washington, DC 20418

**OPEN SESSION**

**Remote Access Information**
**U.S. (phone):** +1 (646) 558-8656 or +1 (669) 900-6833 — **Meeting ID**: 908-488-239
**France (phone):** +33 (0) 1-8288-0188
**Link**: https://nasem.zoom.us/j/908488239

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| 7:30 a.m. | *Breakfast available in the meeting room* | |
| 8:30 a.m. | Preservation of Biotic/Abiotic Biosignatures | Jennifer Eigenbrode<br>Goddard Space Flight Center |

**MEETING WILL GO INTO CLOSED SESSION FOLLOWING THE SPEAKER**

Statement of Task

In preparation for and as an input to the upcoming decadal surveys in astronomy and astrophysics and planetary science, the National Academies of Sciences, Engineering, and Medicine will appoint an ad hoc committee to carry out a study of the state of the science of

astrobiology as it relates to the search for life in the solar system and extrasolar planetary systems. The study will have the following objectives:

- Take account of and build on NASA's current Astrobiology Strategy 2015;
- Outline key scientific questions and technology challenges in astrobiology, particularly as they pertain to the search for life in the solar system and extrasolar planetary systems;
- Identify the most promising key research goals in the field of the search for signs of life in which progress is likely in the next 20 years;
- Discuss which of the key goals could be addressed by U.S. and international space missions and ground telescopes in operation or in development;
- Discuss how to expand partnerships (interagency, international and public/private) in furthering the study of life's origin, evolution, distribution, and future in the universe;
- Make recommendations for advancing the research, obtaining the measurements, and realizing NASA's goal to search for signs of life in the universe

In the course of conducting this study, the committee will consider and regularly consult with the concurrent study "Exoplanet Science Strategy," in the area of assessing habitability, searching for signs of life, and other relevant areas of scientific overlap. Also the committee will not revisit or redefine the scientific priorities or mission recommendations from previous decadal surveys.

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**The following information is provided for any members of the general public who may be in attendance:**

This meeting is being held to gather information to help the committee conduct its study. This committee will examine the information and material obtained during this, and other public meetings, in an effort to inform its work. Although opinions may be stated and lively discussion may ensue, no conclusions are being drawn at this time and no recommendations will be made. In fact, the committee will deliberate thoroughly before writing its draft report. Moreover, once the draft report is written, it must go through a rigorous review by experts who are anonymous to the committee, and the committee then must respond to this review with appropriate revisions that adequately satisfy the Academy's Report Review committee and the chair of the NRC before it is considered an NRC report. Therefore, observers who draw conclusions about the committee's work based on today's discussions will be doing so prematurely.

Furthermore, individual committee members often engage in discussion and questioning for the specific purpose of probing an issue and sharpening an argument. The comments of any given committee member may not necessarily reflect the position he or she may actually hold on the subject under discussion, to say nothing of that person's future position as it may evolve in the course of the project. Any inference about an individual's position regarding findings or recommendations in the final report are therefore also premature.

**NOTES**

**NAS Building:** Is located at 2101 Constitution Ave., NW, between the State Department and the Vietnam Veterans Memorial. Additional information about the NAS Building is available at http://www.nationalacademies.org/about/contact/nax.html.

**Metro:** The closest Metro station (0.5 miles) is Foggy Bottom (Blue, Orange and Silver lines; exit and turn right onto 23rd St., then turn left onto C St. once you have passed the State Department) — see http://www.nationalacademies.org/about/contact/na_069684.html. Information about the D.C. Metro can be found at http://www.wmata.com/.

**Parking:** Very limited parking is available onsite at the NAS. The 22 available parking spaces are first come first served.

**Wi-Fi Connection:** To connect to the Wi-Fi choose "Visitor Network" then open up a browser and click "Accept terms and conditions." You will then be connected to the internet.