

SPACE SCIENCE WEEK

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SPACE SCIENCE WEEK

SPRING 2018 MEETING OF THE COMMITTEE ON BIOLOGICAL AND PHYSICAL SCIENCES IN SPACE

March 27-29, 2018

NAS Building – 2101 Constitution Ave NW – Washington D.C

OPEN SESSION AGENDA

Tuesday March 27, 2018

MORNING PARALLEL BREAK-OUT SESSION

COMMITTEE ON BIOLOGICAL AND PHYSICAL SCIENCES IN SPACE (CBPSS) – Board Room

7:30 AM *Registration Opens and Working Breakfast is Available in the Great Hall*

OPEN SESSION

9:00 AM **Welcome and Introductions** **Rob Ferl and Elizabeth Cantwell, Co-Chairs**

9:15 AM **SLPSRA Program Status** **Craig Kundrot, NASA**
• Midterm Report
• Implications of ISS Budget Plans
• Status of SLPSRA role in DSG
• SLPSRA organizational status and plans

10:25 AM **Discussion: ASGSR and the Next Decadal Survey** **Anna-Lisa Paul, ASGSR**

11:00 AM *Break Available Outside Room*

EXECUTIVE SESSION

11:15 AM to 12:00 PM **Committee Discussion**

12:00 PM *Lunch available in the Great Hall*

PLENARY SESSION Kavli Auditorium

Opening Session

1:00 PM **Welcome** **Fiona Harrison, SSB Chair**

1:05 PM **Quick Update on Current SSB Activities** **Dick Rowberg, Interim SSB Director**

Focus Session on NASA Science Program

1:15 PM **NASA-SMD Budget, Program, and Priorities** **Thomas Zurbuchen, NASA**
Presentation 20 mins / Q&A 25 mins

Focus Session on International Collaboration – Program Briefs

2:00 PM **Short 15-minute Talks From Agency Representatives**

- **ESA Space Science** – Fabio Favata, ESA-SCI
- **ESA Human and Robotic Exploration** – David Parker, ESA-HRE
- **ESA Earth Observation Programs** - Status and Future Challenges – Maurice Borgeaud, ESA-EO
- **Chinese Academy of Sciences: Current and Future Programs** – Ji Wu, CAS National Space Science Center
- **JAXA Institute of Space and Astronautical Science** – Hitoshi Kuninaka, JAXA-ISAS Deputy Director General
- **JAXA ISAS Research** – Masaki Fujimoto, JAXA-ISAS Research

3:30 PM *Break Available in the Great Hall*

Focus Session on International Programs – Discussion on Collaboration

4:00 PM **Personal Perspective on State of International Collaboration: Len Fisk, President of COSPAR**

4:15 PM **Moderated Q&A Sessions with NASA, COSPAR and International Agency Representatives**
Moderator: Fiona Harrison, SSB Chair

5:30 PM **Closing Comments: SSB Chair**

Public Meeting Adjourns

Annual Space Science Week Reception and Dinner — By Invitation Only

(Committee Members, Plenary Speakers, and Guests by Invitation Only)

6:00 PM *Reception in West Court*
7:00-8:30 PM *Dinner in the NAS Great Hall*

Wednesday March 28, 2018

COMMITTEE ON BIOLOGICAL AND PHYSICAL SCIENCES IN SPACE (CBPSS) Room 125 (NOTE THE ROOM CHANGE)

7:30 AM *Registration Opens and Working Breakfast is Available in the Great Hall*

OPEN SESSION

Symposium¹: Space Life and Physical Sciences Research Supporting Moon and Mars Missions

9:00 AM **Welcome and Introductions** **Robert Ferl and Elizabeth Cantwell, Co-Chairs**

Session 1: Symposium: Human Health Is Pivotal for the Mission to Mars

9:15 AM **Integrated Resistance and Aerobic Exercise Training Protects Against Multi-System Deconditioning: Results from the NASA 70 Day Bed Rest Study** **Jessica M. Scott, Principal Investigator, Memorial Sloan Kettering Cancer Center, New York City**

¹ Symposium Zoom connection instructions available at the end of the agenda.

9:45 AM	The Promise of Genomics and Epigenetics Studies in NASA Exercise Research	Shlomit Radom-Aizik, Associate Professor of Pediatrics and Director, UC Irvine Health Pediatric Exercise and Genomics Research Center (PERC), School of Medicine, University of California, Irvine
10:15 AM	<i>Break Available Outside Room</i>	
10:30 AM	The Role of Artificial Gravity for Maintaining Human Health on Both the Moon and Mars	Vincent Caiozzo, Professor, Department of Orthopedics and Physiology and Biophysics, University of California
11:00 AM	<i>Exercise is Medicine</i> is Pivotal for Humans to Go to Mars and Return to Mother Earth	Scott Trappe, Professor of Exercise Sciences and Director of the Human Performance Laboratory, Ball State University
11:30 AM	Additional Q&A Moderator: Ken Baldwin, University of California, Irvine	
12:00 PM	General Discussion <i>Working Lunch Available in the Great Hall</i>	

Session 2: Physical Processes and Technology for Exploration

1:30 PM	Plans and Design Challenges for Nuclear Thermal Propulsion Systems Supporting Deep Space Transportation	Ronald J. Litchford, Principal Technologist for Propulsion, Space Technology Mission Directorate, NASA
2:05 PM	Plans and Design Issues for Nuclear Power Systems Supporting Human Missions to Planetary Surfaces	Patrick Ray McClure, Kilopower Project Lead, Los Alamos National Laboratory
2:40 PM	<i>Break Available Outside Room</i>	
3:10 PM	Reduced Gravity and Environmental Issues in the Design and Operation of In-Situ Resource Utilization Systems for Human Missions	Gerald (Jerry) Sanders, Lead for ISRU System Capability Leadership Team, Human Exploration and Operations Mission Directorate, NASA
3:45 PM	ISRU Construction and Excavation of Regolith	Robert Mueller, Senior Technologist, Science and Technology Projects Division, NASA KSC
4:20 PM	Additional Q&A Moderator: Betsy Cantwell, Arizona State University	
5:10 PM	<i>Symposium Adjourns</i>	
5:30 PM	(Committee Members, Plenary Speakers, and Guests by Invitation Only) <i>Buffet Working Dinner in the West Court</i>	

Public Lecture – Kavli Auditorium

7:00 PM	The Gravitational Wave Astronomical Revolution Dr. David Reitze, Executive Director of the LIGO Project, CalTech
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Thursday March 29, 2018

COMMITTEE ON BIOLOGICAL AND PHYSICAL SCIENCES IN SPACE (CBPSS) – Room 125

EXECUTIVE SESSION

9:00 AM to 12:00 PM

Committee Discussion

GENERAL NOTES

Pre-registration: All participants, including committee members, invited speakers and other attendees, are strongly encouraged to preregister at <http://www.surveygizmo.com/s3/4142600/07f04547401e>.

• **Registration** will be located in the Great Hall during the event. Please check-in there to receive your badge.

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>.

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.

Metro: The closest Metro station (0.5 miles) is Foggy Bottom (Blue and Orange lines; exit and turn right, then turn left once you have passed the State Department)—see <https://www.wmata.com/rider-guide/stations/foggy-bottom.cfm>.

Parking: Very limited parking is available onsite at the NAS. The 22 available parking spaces are first come first served. Other available parking options are as follows:

- Columbia Plaza –23rd and Virginia Avenue NW.
- Colonial Parking – 20th Street, NW, between E and F Streets.

Space Science Week Website: http://sites.nationalacademies.org/SSB/SSB_182835

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 in its charge. 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 nor will recommendations be made. Observers who draw conclusions about the committee’s work based on this meeting’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 are therefore also premature.

RECORDING OF THE MEETING

This meeting will be recorded by the NRC. Please be aware that by attending the meeting, you consent to your voice being recorded for use by the NRC for the purpose of note-taking. This recording will not be publicly released, shared outside of the NRC, or used for other public purposes.

NOTES FOR PRESENTERS

If your presentation contains unpublished data, ITAR controlled and/or other sensitive information, please be aware that the open sessions at the meeting may be recorded and/or webcast. Presentation materials given to the committee may be posted on a publicly accessible website. Please edit your presentations accordingly.

Mac users should assume that their presentation will be displayed via one of the NRC’s PCs. If your presentation is graphics heavy and best displayed via your own laptop, you should also bring a plain-vanilla pdf version of your presentation with you. The audience in the meeting room will see your presentation via your laptop and we will webcast the pdf file.

At some point a staff member will be asking you to sign a consent form allowing us to use your presentation, specifically to post it on our website.

REMOTE CONNECTION DETAILS

Symposium Zoom Instructions:

Join from a computer:

1. Click on the url (below). A popup will come up that says "Open URL:Zoom Launcher;" Click the open button and let Zoom load (may take a minute).
2. Once loaded, Zoom will automatically provide you a pop-up window to join the audio. Please click the "call me" tab and enter the phone number you would like to be called at (i.e. home, office, mobile). Click "Call me" and follow the prompts. Join from a mobile device:
 1. Download the Zoom app from your phone's app store (if you don't have it installed already).
 2. Click on the url (below), or open the Zoom app and enter the meeting ID (below), and press join. Enter your name if requested.
 3. Zoom will automatically provide you a pop-up window to join the audio. Select the "Call my Phone" option from the menu, enter your phone number, press call, and follow any prompts.

Join by phone only:

1. Connection quality is much better via Zoom's "Call me" feature, so we strongly recommend that you connect this way.
2. If you are not able to do so, you can dial 1-877-853-5257 (Toll Free) and enter the Meeting ID (below). International numbers are available at: https://nasem.zoom.us/zoomconference?m=dm0fun9LyXrhECcUWQt2Wwdh_9TUrhXG

Remote Access Information

Dial: US: +1 669 900 6833 or +1 855 880 1246 (Toll Free)

Meeting ID: 190 757 245

Link: <https://nasem.zoom.us/j/190757245>

NOTICE: The Zoom service allows audio and any materials exchanged or viewed during the session to be recorded and shared. Please be aware that by participating in this activity, you consent to your voice, likeness, and any materials you provide, being recorded for use and dissemination, without payment of any compensation for such use, in any language, format, or media now known or later devised, and you release the National Academies of Sciences, Engineering, and Medicine from any and all claims, liability, or damages arising from any such use. The Academies will proceed in reliance upon such consent and release. If you do not consent to the foregoing, please do not join the session.